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Soap Trucks Replace Lighters Horses


# The Commercial Vehicle

Volume XIII
Number 1

AUGUST 1, 1915

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*Manufacturers of*

**Four Wheel Drive Trucks**

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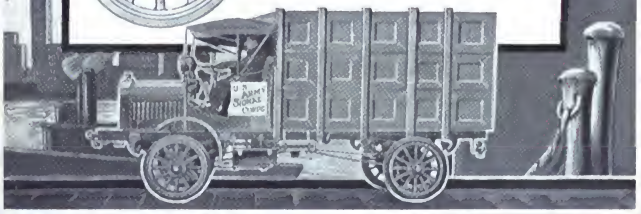


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CLEVELAND

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The COMMERCIAL VEHICLE

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The Commercial Vehicle
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Vol. XIII August 1, 1915 No. 1

# Trucks Make Possible Direct Delivery from Suburban Soap Plant

## Old Method Using Lighters Towed to Gotham Pier with Horses for Final Delivery Eliminated—Trucks Increase Delivery Area Tenfold

By Joseph Husson

ORIGINALLY located in New York City, B. T. Babbitt, Inc., one of the large soap manufacturers of the east, was forced by a need for larger space to move its plant outside of the city limits, from which location it found it impossible to make direct deliveries by horses. Motor trucks have solved the problem.

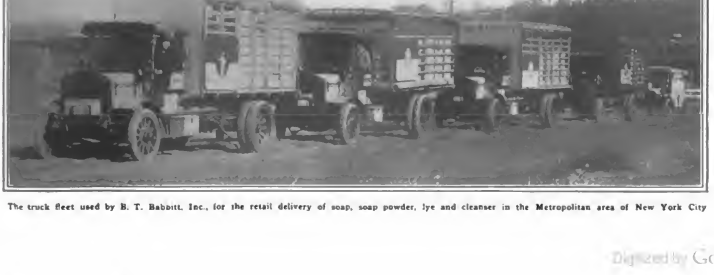
The Babbitt company secured a site in the New Jersey meadows on the Hackensack river at Babbitt, N. J. From there it made its local Metropolitan deliveries by means of lighters towed down the Hackensack river to a pier in the Hudson river and thence by horses to the doors of its customers. The cost of this method was excessive. In an endeavor to reduce this cost, the company carried on extensive tests with motor trucks. It has now disposed of all except two of its horses and replaced them with one-fourth the number of motor trucks. These make direct deliveries to all parts of the Metropolitan area. The truck delivery area is approximately ten times as large as that formerly served by horses.

### Delivery Area Increased Tenfold

The cost of motor truck delivery is approximately the same as the cost with horses in an area only one-tenth as large. The trucks when first purchased covered only the same area as served by horses and under these conditions reduced the cost approximately 8 cents per 100 pounds delivered.

Until the early part of 1907, the plant of the Babbitt company was located in the lower section of Manhattan Island. Deliveries were made from this plant to all points on the island of Manhattan and to nearby points in Brooklyn by horses exclusively.

A site was purchased on the New Jersey meadows, just east of the Hackensack river and approximately 3 miles inland from the Hudson river at a point opposite One Hundred Tenth street. A new plant was erected at this location and put into operation in the latter part of 1907, at which time the factory in New York City was discontinued.



The truck fleet used by B. T. Babbitt, Inc., for the retail delivery of soap, soap powder, lye and cleanser in the Metropolitan area of New York City

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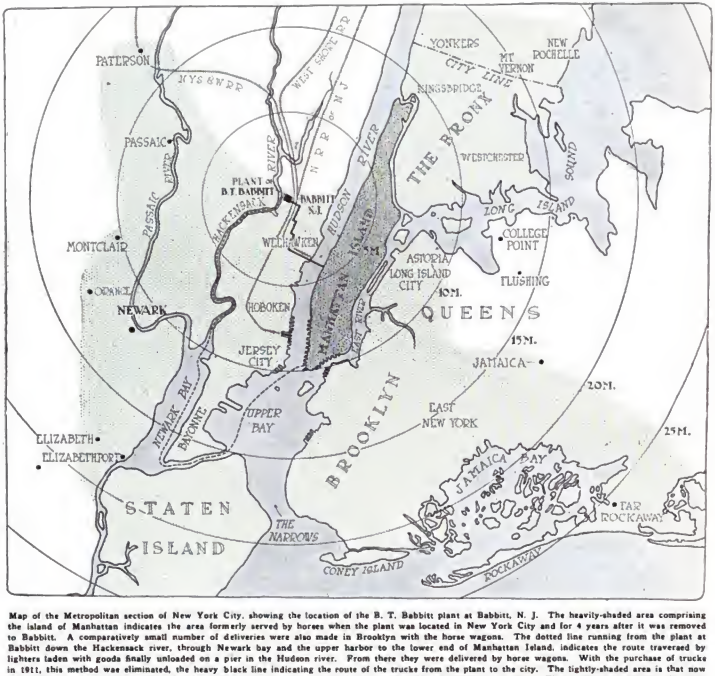


**Map of the Metropolitan section of New York City, showing the location of the B. T. Babbitt plant at Babbitt, N. J. The heavily-shaded area comprising the island of Manhattan indicates the area formerly served by horses when the plant was located in New York City and for 4 years after it was removed to Babbitt. A comparatively small number of deliveries were also made in Brooklyn with the horse wagons. The dotted line running from the plant at Babbitt down the Hackensack river, through Newark bay and the upper harbor to the lower end of Manhattan Island, indicates the route traversed by lighters laden with goods finally unloaded on a pier in the Hudson river. From there they were delivered by horse wagons. With the purchase of trucks in 1911, this method was eliminated, the heavy black line indicating the route of the trucks from the plant to the city. The lightly-shaded area is that now served by the motor trucks. The concentric circles are 5 miles apart and are drawn about the plant as a center. They indicate graphically the large increase in the delivery area**

While the new plant was far superior to the old one because it was designed and built especially for the manufacture of soap, soap powder, lye and cleanser, its location on the New Jersey meadows, with no direct and quick route into New York City, made the question of the delivery of the company's goods a serious problem. Having used horses exclusively for its deliveries from the old factory, the company still persisted in their use after it had occupied its new plant.

### Direct Delivery Impossible With Horses

It was out of the question, however, for horses to make the entire trip from the plant to the city because of the many steep hills which have to be negotiated in the ascent of the Bergen hills lying just back of Hoboken and Weehawken and running parallel with the Hudson river. To reach the ferries running between those towns and New York City there is no other direct route except to cross these hills. Very slow time is made by horse vehicles with heavy loads on these hills and it would have been necessary for the Babbitt company to maintain extra horses at relay stations in New York City to make deliveries of its goods to the upper part of Manhattan and the outlying points in Brooklyn. This method would have been too expensive and was therefore abandoned.

The close proximity of the new plant to the Hackensack river offered another method, the use of lighters towed down the Hackensack river, through Newark bay and thence through the upper harbor to Manhattan Island. As some of the large foreign shipments were to be handled in this manner, it was also decided that the local deliveries could best be taken care of in the same way. Accordingly a portion of one of the piers in the Hudson river on the lower end of Manhattan Island was rented. Lighters were towed from the plant to this pier and the goods unloaded. From there they were delivered in New York City and Brooklyn by two-horse wagons.

### Pier Rental Excessive

Under this system, the cost of delivery was excessive, mainly because of the high rental which had to be paid for the use of the pier and because of the con-

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tinued loss of goods stolen therefrom, and which loss continued no matter what stringent precautions were taken. This method was also very slow, due to delays encountered by the lighters in stormy or foggy weather. A considerable stock had to be kept on the pier to meet rush orders and it was the amount of this stock which enabled inroads to be unlawfully made into it.

This method was used until 1912, when the use of motor trucks was proposed to the Babbitt company.

### Horse Delivery to Piers

To determine whether trucks were actually cheaper and more efficient than horses, the Babbitt company inaugurated a series of extensive tests with several different makes of trucks. These were run over the same routes which they would have to cover in the service of the Babbitt company. Accurate cost records were kept of each vehicle for comparison with each other and with the delivery method using horses and lighters. It was finally decided that the trucks were more efficient and a 5-ton truck was purchased in August, 1911, and put in service.

This truck proved so efficient that another of the same make, but of 4-ton capacity, was bought in December of the same year. Another 5-ton vehicle was delivered in February, 1912. These three trucks were sufficient to make all deliveries until 1913, when a 5-ton truck of another make was added to the fleet. A Ford equipped with a commercial body was purchased in the latter part of 1914 to carry advertising matter to the various dealers and for work in the premium department maintained by the company. It is also sometimes used to make special deliveries.

During this period the horses of the company had been gradually disposed of as each new truck was added to the fleet, until the purchase of the last truck when only one two-horse wagon was in use. This team is still maintained to make deliveries to the piers in downtown New York on which gasoline trucks are not allowed.

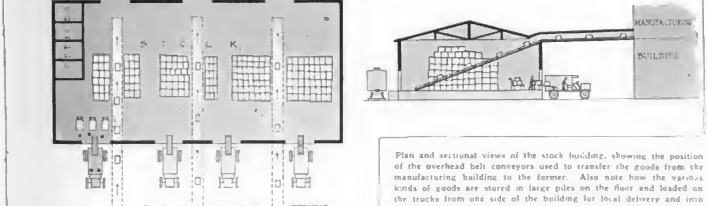
With horses the delivery area comprised only the island of Manhattan and the nearby points in Brooklyn. It has been increased tenfold by the use of trucks. In New Jersey it extends as far north as Paterson; as far west as Montclair, including the intermediate points; as far south as Elizabethport, and on the east includes Bayonne, Jersey City, Hoboken and Weehawken. It includes all of Staten Island, Manhattan Island, the Bronx and Brooklyn as far out as Coney Island and Far Rockaway. In the borough of Queens, it includes Long Island City, Astoria, and extends east as far as Jamaica. Deliveries are also made north of the northern boundary of the Bronx to Yonkers, Mt. Vernon and New Rochelle.

### Daily Deliveries in Manhattan

Deliveries are made every day in Manhattan and Brooklyn and two trips or more each week to the outlying points in New Jersey, Queens, Yonkers, Mt. Vernon and New Rochelle.

The route traversed by all the trucks

**The Pierce-Arrow 5-tonner, shown backed up to one of the loading doors of the stock building. Note that the floor of the truck body is flush with that of the building. Also note the side door in the truck body which is used to expedite unloading. The corrugated iron framework shown entering the roof incloses a belt conveyor by which the boxes of soap, lye, and cleanser are transferred from the second story of the manufacturing building to the floor of the stock building**




Plan and sectional views of the stock building, showing the position of the overhead belt conveyors used to transfer the goods from the manufacturing building to the former. Also note how the various kinds of goods are stored in large piles on the floor and loaded on the trucks from one side of the building for local delivery and into freight cars for distant shipments. In the cross-sectional view to the right, is shown one of the trucks being loaded. Note the type of small four-wheeled hand trucks used to transfer the goods from the various piles to the loading door and the roller gravity conveyors used to eliminate the carrying of the boxes from the rear to the front of the truck

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making deliveries in New York from the plant is south along the Bergen turnpike and then west to the Weehawken ferry which terminates on the New York side at west Forty-second street.

The horse wagon still maintained by the Babbitt company is kept in New York City, and each morning crosses the Weehawken ferry to the New Jersey side, where it is met by one of the 5-ton trucks with a load of goods from the plant. This load is transferred to the horse wagon which in turn delivers it to the various piers along the waterfront on which gasoline trucks are not allowed. After the load has been transferred, the motor truck then returns to the plant where it is again loaded before starting out on its second trip of the day.

Besides making deliveries to the piers on which trucks are not allowed, the horse wagon also delivers to those piers at which there is much congestion which would hold the trucks up for undue periods of time.

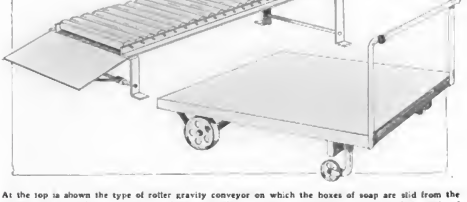
### Time Losses at Plant Reduced

Time losses at the plant have also been eliminated as far as possible. The stock of goods is kept in a separate building with four loading doors, one for each truck. The sills of these doors are at the same height above the ground as the floors of the truck bodies, so that no lifting is required in placing the goods on the trucks.

The goods are received in the stock building from the boxing department of the manufacturing building, which is separated from the former by a wide alley, by means of overhead conveyors which deposit them automatically on the stockroom floor. From the bottoms of these conveyors, the goods are carried on small four-wheeled hand trucks to other parts of the building where they are placed in high piles with aisles between each.

B. T. BABBITT, Inc.
MOTOR TRUCK TEST REPORT

Form of inspection card used in the B. T. Babbitt garage, with imaginary entries. The cards are made of heavy cardboard with a hole at the top through which a string is run for attachment to the vehicle. As the mechanics make the necessary repairs, they check off each item on the card, so that none can be overlooked. As the trucks leave the garage in the morning the cards are removed and sent to the superintendent of transportation for his reference and file



At the top is shown the type of roller gravity conveyor on which the boxes of soap are slid from the loading door into the truck body. When the loading is started, these conveyors are pushed inside of the truck body. As the truck becomes loaded, they are pushed back into the stock building from time to time until the entire load is put on. The use of these conveyors permits the vehicles to be loaded quickly and eliminates the lifting of the boxes from the floor into the trucks. At the bottom, to the right, is shown the type of four-wheeled hand truck used to transfer the goods from the stock piles to the loading door. The entire truck load is placed on hand trucks of this kind before the former backs up to the loading door, thus reducing the loading time

### Load Prepared for Trucks in Advance

Before the truck backs up to the loading door to receive its load, the man in charge of the stock building has received his order showing the amount and the kinds of goods which the truck is to carry. He then collects the various amounts of the different articles which are to compose the load on as many of the small four-wheeled trucks as are necessary and has these pushed to the door at which the truck is to be loaded.

When the truck arrives, its load is all ready. All that has to be done is to place it in the truck body. This is not done by carrying each of the boxes from the small trucks to the large one, but by means of an inclined roller gravity conveyor which is pushed into the truck body. These conveyors are similar in design to those used by the metropolitan dairy concerns for loading cased milk and which were described in THE COMMERCIAL VEHICLE of June 1, 1914. They consist of a metal frame mounted on four legs, the front two of which are shorter than the rear two. The top of the device is made up of two parallel angle-irons between which are placed several steel rollers held by pins on their ends in holes in the angles.

### Gravity Conveyors Save Time

In use, the conveyor is placed entirely within the body of the truck and the boxes slid down it on the rollers. As the forward end of the body is loaded, the conveyor is moved back toward the rear until the entire load is put on. By the use of these conveyors and the small hand trucks, each 5-ton truck may have a full load placed on it in 10 to 15 minutes, with practically no lifting on the part of the loaders.

In a further endeavor to decrease the idle time of the trucks, each is equipped with a covered staked-type body having side doors, to permit of quicker unloading while on the route.

### Trucks Inspected Daily

The entire fleet of trucks is maintained in the company's own garage at the plant. It is in charge of one competent mechanic who inspects each of the trucks as they come in every night. He is furnished with cardboard tags like the one shown in the illustration at the bottom of this page. Upon these are listed the important component parts of the truck with dotted lines after each item upon which he notes the condition of the various parts. After his inspection of the trucks these cards are filled out and attached to the vehicles so that in making the repairs none can be overlooked. As each part is attended to, it is checked off on the card, which is then sent to the superintendent of transportation for his information and file. The mechanic in charge of the garage makes all the minor repairs each night. If any major repairs are to be made, he secures the help of several mechanics from other departments of the plant.

### Truck Advertising Value Realized

The Babbitt company is very proud of the appearance of its trucks and for this reason each is washed and polished every night. They are all painted in blue and gold, the same colors that are used on the cartons in which the goods of the company are wrapped. This attaches a

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One of the Peerless 4-ton trucks. The body of this vehicle and those of the other members of the fleet are painted in blue and gold, the colors used on the Babbitt carton wrappers

great advertising value to the trucks which the Babbitt company has been quick to grasp. Daily washings keep the vehicles spick and span and enhance their advertising value.

The men detailed to do this work are not ordinary laborers but apprentice mechanics working in other departments and who have enough intelligence to detect loose or missing bolts and broken or cracked castings. These men in cleaning the mud and dirt off the frames and running gears often discover damaged parts in time to prevent serious trouble.

The entire fleet of trucks is well maintained. Small repairs are attended to before they have a chance to become serious. Horses are used where the trucks would be a failure. Loading and unloading time at the plant are reduced to a minimum by the provision of a loading door for each vehicle and by the use of roller gravity conveyors and small hand trucks. Side doors in the truck bodies have decreased the unloading time on the route. These are the reasons which have spelled truck success.

# Route Truck Makes an 1,800-mile Trip

## PLACES SIGNS ON COAST FROM MEXICO TO VANCOUVER

PLACING a sign on an average once a mile in the 1,800 miles from the Mexican frontier to Vancouver, B. C., along the Pacific Highway, using a 1½-ton White truck with Goodrich dual pneumatic rear tires for transportation is the stunt recently completed by Chester C. Lamb, who is handling the Coast division of this national work. While only the main lines and roads suitable for touring affording side trips of interest have been marked, the great activity in road construction along the coast made it necessary for the truck to pass through many stretches of rough going ahead of the contractors. The piece of road shown in the illustration is now a first-class hard-rolled smooth-surfaced highway, but when Mr. Lamb had the misfortune to encounter it early in November on his run between Portland and Seattle, it was a new yellow clay fill, in just the stickiest condition this troublesome material can assume with a certain degree of moisture. The picture was taken at a point where the truck, after pulling through a ¾-mile stretch to within 35 feet of the plank flooring of a covered bridge, got bogged down so tight that it took four horses and the truck's own power to get it out. In this kind of going, water will run in under the wheels and puddle the clay so that it is like grease, giving practically no traction whatever. Five cars attempting to follow in the track made by the truck got badly stuck.

In spite of obstacles like this and many bad grades encountered, the truck went through the season without a serious failure and enabled the work to be pushed forward on a well defined schedule, so that the 1915 motor tourists will have the benefit not only of the good roads, but of an efficient system of direction. The touring car owner will glide along with little thought of the heavy duty pioneering of the truck, but this trip has been an important demonstration of the ability of a truck to give service under a great variety of ordinary and extraordinary conditions when far from its home base of supplies.

Who said good roads? This is one of the stretches of road between Seattle, Wash., and Portland, Ore., before the contractors set to work on it, which Chester E. Lamb and his 1½-ton White truck had to traverse in the placing of route signs along the Pacific Highway from the Mexican border to Vancouver, B. C. The road shown is a new yellow clay fill with just enough moisture to make it in the stickiest condition which this troublesome material can assume. On one occasion the truck got bogged down so tight that it took the truck's own power and four horses to get it out

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## American Ambulance Work "Somewhere in France" With U. S. A. Motor Trucks

By W. F. Bradley

RED CROSS service trucks are an essential feature of the American field hospital which has just gone into service with the French army. The hospital, which is an American donation, is an extension of the American ambulance established early in the war at the Lycee Pasteur, near Paris. Its equipment comprises six hospital tents with eighteen beds in each, eight bell tents, four kitchen tents and six officers' tents. This material is carried on four Pierce-Arrow 5-ton trucks supplied by the French government. These trucks are a part of the first order for 5-tonners placed by the French authorities.

Two hours are required to strike tents, fold beds and bedding and pack the entire equipment in the trucks. Within 2 hours of the finish of the road journey the tents can be erected and the hospital again be in working order. This extreme mobility, made possible by the use of trucks, allows the field hospital to keep pace with the movements of the army in the field and thus enables doctors to deal with wounded cases in must shorter space of time than is possible under any other system.

Five French surgeons, thirty-six hospital attendants and twenty-five drivers and assistants are attached to the hospital. The equipment is such that all kinds of surgical cases can be dealt with, operations being performed on the field and such medical attention given that tetanus and gangrene need not be feared.

### Tasks of the Trucks

The American field hospital is always located as near to the firing line as possible. When established the trucks are used for bringing up supplies and food for the staff and patients. Obviously this is an easy task for four trucks of this capacity, and their real work is only done when a removal is ordered. Wounded are brought in from the firing line to the hospital by a fleet of ten Ford ambulances, to which are attached one Ford repair shop and stores, one commander's car and a couple of Ford service cars. The ambulances are used for no other purpose than bringing in the wounded and are always kept in readiness for this work, so that at whatever hour of the day or night the hurry-up call should be received they are able to respond.

FORD SUPPLY CAR AND WORKSHOP AND 5-TON PIERCE-ARROW AMBULANCE AND TRUCK, BOTH ATTACHED TO AMERICAN FIELD HOSPITAL

Trucks are also made use of in connection with a surgical field hospital presented to the French army by members of the Argentine colony in Paris. In this hospital the two temporary buildings are composed of wood panels with a canvas roof. Two ordinary trucks are employed for carrying the material. Attached to the operating hall is a special Berliet 2-ton truck with a van body and a rear platform carrying a vertical boiler.

The interior of the body is a sterilizing room for treating surgical instruments, the steam being obtained from the boiler on the rear platform. This boiler also supplies water for washing the wounded, and when that becomes necessary will supply steam for heating the operating hall by means of three radiators. There is a big door on one side of the sterilizing van, allowing it to open direct into the operating room.

The second building, used for X-rays operations, has attached to it a special 2-ton Berliet truck, also with a van type body, containing all the appliances necessary for this work. This vehicle also provides the electric light required by the entire hospital. Curret is obtained from two gasoline-electric

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groups, driven by single-cylinder motors mounted immediately behind the driver's seat. These groups are of the type commonly employed in France for lighting country houses and yachts. A wood platform receives the motor, to which a dynamo is direct coupled, also the radiator, water tank, gasoline and oil tanks. They are so compact that the two can be placed in a space no greater than that of the driver's seat.

This hospital has attached to it a fleet of Schneider and Panhard ambulances, used exclusively for bringing wounded in from the field of battle. The field hospital can undertake on an average 50 operations a day.

Owing to the nearness of the hospital to the firing line and the excellent motor service, it is often possible to operate on men within a few minutes of the time they fall, thus avoiding many of the complications which frequently arise when wounded men have to be carried long distances to the rear before receiving surgical attention. Men are cleared out of this hospital as quickly as possible, so as always to leave room for others who may come in. This work of removal is done by other ambulances working from hospitals further in the rear.

PIERCE-ARROW 5-TONNER, ABOVE, EQUIPPED FOR AMBULANCE AND HOSPITAL TRANSPORT SERVICE WITH THE AMERICAN FIELD HOSPITAL. THE TRUCKS, OF WHICH THERE ARE FOUR, WERE SUPPLIED BY THE GOVERNMENT OF FRANCE

AN AUTOCAR WHICH CAME FROM PHILADELPHIA TO HELP CARRY WOUNDED IN FRANCE. IT CARRIES SIX STRETCHERS AND HAS AN ABUNDANCE OF ROOM FOR SITTING PATIENTS AND ORDERLIES

BELOW, JUMBO, EIGHT-CYLINDER DE DION-BOUTON HORSE VAN FORMERLY USED TO TRANSPORT RACE HORSES, NOW TAKING LOADS OF EIGHTEEN WOUNDED AT A LOAD TO THE AMERICAN HOSPITAL IN PARIS

## ELECTRIC PROSPERITY WEEK

NEW YORK CITY, July 22—The week of November 29 to December 4 will be Electric Prosperity Week all over the country, according to the plans of the Society for Electric Development, Inc., New York City. Electric vehicles are to be made a feature of this celebration. The E. V. A. has pledged its support in the way of parades of electric trucks.

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## Motor or Mules

AFTER a year of war in Europe in which the motor truck has continually demonstrated its superiority over horse or mule power our country goes on in the old civial war atmosphere with its national encampments, using the same old two- and four-horse or mule wagons, moving at the same mule pace and with the same mule capacity. The New York state encampment with its 5,000 men has only five motor trucks of its own; true, there are a few loaned by zealous makers and dealers, but to all intents and purposes the army department is still moving at mule pace and with mule capacity. The field kitchens are still slowly and laboriously hauled about by four mules, much of the commissary is so handled; in fact the motor truck is still a factor of surprise and has not yet become an accepted part of the army.

Our truck makers should endeavor to present the situation more forcibly to the army department. If our navy has decided that an advisory board composed of leading inventors from different professions is needed, it is certain that an army advisory board is equally needed. Those few trucks that are being used in the army in the encampment in question are rarely being used with any judgment. Several of them have been put out of commission by sheer ignorance of horse drivers, drivers who did not know the essentials of lubricating the gasoline motor. It is almost hopeless to expect motor trucks to succeed under such unfavorable circumstances.

Our truck makers should take the question up much more actively and directly. It is certain that within the next 10 years many hundreds and thousands of motor trucks are going to be purchased by the army. Instead of so much energy being wasted on armored cars it would be much better to secure equipment of motor vehicles for the commissary, for the munition columns and for transport work.

## A Step Farther

DEMONSTRATING that the 7-inch single is preferable to the 3½-inch or even the 4-inch dual, SINGLE TIRES from 7 inches width down have been established as preferred practice, as reported and commented upon on this page of the last issue of THE COMMERCIAL VEHICLE. But although this is the last word from the rubber world, it is not the last deed. For some time various of the experimental departments of the great Akron plants have been working on still larger tires. If the single tire is better for the 2-tonner, why is it not equally advantageous for the 5-tonner?

If the 7-inch single is practical, why not the 10-inch, or even the 12-inch? A number of 10-inch singles are on the road today, in the hands of private concerns. The wide single tire has failed in the past; but so has the cord tire. That the cord tire is today becoming the dominant type proves that the principle is right. The steel-base solids give every promise of success in the wider treads.

## Motor Truck Fenders

IN these days of fender agitation both commercial vehicle makers and users must be cautious lest they be made the tools of certain corporations that are using their influence to have legislation passed in different cities making all manner of fenders imperative, whether of merit or not, merely for the purpose of creating a market for certain fender designs they are interested in.

Before we make more equipment mandatory on commercial motor vehicles let us be certain that there is merit in connection with such parts. So often an accident occurs and immediately three or four would-be legislators begin framing laws for new devices to make such accidents impossible.

Up to the present in some cities energy has been expended to get fenders for the front wheels of motor trucks, but immediately up comes a report showing that more accidents are caused by the rear wheels of trucks than by the front wheels. At once begins the agitation for rear-wheel fenders, and certain people would like our city fathers to at once pass laws making rear wheel fenders imperative.

Fewer laws and more common sense are needed. Rear wheel fenders are good and a campaign of education would soon lead many of our leading truck users to see that such would be an investment. Some concerns have already found this out; but it would be regretable if our cities started passing laws requiring certain specified forms of rear-wheel fenders on motor trucks. The law would be unwieldy and while working as a benefit in not a few cases would prove an injury in other cases. Let truck makers take up the thread of education with their users. They can design a simple form of rear-wheel fender that can readily be fitted to their trucks going into those industries where great danger is possible.

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# OSTRUP'S ORGANIZATION OMNISCIENT

AN organizer and an engineer, he operates his huge fleet of eighty-eight motor trucks like a general maneuvers his army.

Like the latter he considers each unit of his forces and its relation to the whole; he studies the conditions to be met on the field of battle; he marshals his forces at strategic points to secure the greatest effect under the given conditions and makes the most telling disposition of reserve forces to guard against unforeseen contingencies. Careful study of the delivery conditions resulted in the purchase of horses and mules for one class of work, small motor trucks for another class, and large trucks for still another class.

The 5-tonners are the seige guns, the mortars of the delivery equipment. The lighter and speedier motor trucks are the dashing cavalry, used where light loads must be delivered quickly. The horses and mules are the infantry, slow, but necessary in making deliveries where the unloading delays are suicidal to motor truck efficiency.

John C. Ostrup is indeed an organizer, for his motor trucks are scattered in twenty-seven states from Norfolk, Va., on the south; Denver, Col., on the west; Portland, Me., on the north, and New York City on the east.

He is superintendent of equipment and construction of the Texas Co., the large oil firm. He makes his headquarters in the New York City offices of that concern.

Ostrup's position gives him charge of all the delivery equipment and all the buildings, both old and new, of the Texas company in the northern territory which extends north of Mason's and Dixon's line along the eastern seaboard to Maine and west as far as Colorado. He designs and supervises the erection of all new structures for his company in this territory. He is qualified for this work because he is a civil and mechanical engineer of note, having held the professorship of structural engineering at Stevens Institute of Technology before he joined the organization of the Texas company.

Ostrup is not a motor truck engineer, however. Before he accepted his present position he knew comparatively little about motor trucks. His engineering training and experience, however, enabled him to analyze the delivery problem of his company in much the same manner as he would plan, design and supervise the construction of a skyscraper.

Ostrup joined the Texas organization in April, 1910, just after the first motor truck to be used in the northern territory had been delivered. By the fall of 1913 he had fifty-six motor trucks and approximately 400 mules and horses under his supervision. Now he has eighty-eight motor trucks and about 800 mules and horses.

In 1910, motor trucks were an experiment for the Texas company. It did not know exactly where they were best suited to the work to be done. It did not know the line of demarcation between the most efficient use of horses and mules and motor trucks.

It was evident, however, that the company must choose between the purchase of motor trucks and the establishment of many more distribution stations to take care of the increased consumption of gasoline and lubricating oils. Because horse wagons did not fill the bill due to their low mileage ability, trucks were purchased. Due to their great ground-covering ability, they were able to deliver to the outlying points surrounding the present distribution stations without the construction of additional ones.

The trucks purchased, Ostrup's problem was to operate them under the conditions most suitable for their use, eliminating horses and mules in certain places and keeping them in others, according to the results obtained.

Like a general directing his forces in a battle over a large front from a point many miles in the rear, Ostrup from his office in New York City sent out trained technical assistants to all parts of the northern territory to study the conditions of delivery in each locality. These scouts reported to Ostrup. From these reports he was able to divide the deliveries of his company into three general classes, as follows: 1—Long routes on which deliveries are made in bulk and part peddled. 2—Short circular routes on which most of the oil is peddled. 3—Combination routes on which the oil is delivered from the main distribution point to many stations or draw-off points within a 5-mile radius.

From other reports forwarded to him from the accounting department of the company Ostrup was able to analyze the cost of delivery by means of each class of equipment in each of the three classes of work. He found that it cost approximately twice as much to operate maintain a 1,000-gallon tank truck as it did a 1,000-gallon tank wagon. The ratio held good, no matter whether the truck or wagon was actually working or laid up for repairs or overhauling. This meant that the trucks must deliver twice the amount of oil hauled by the horse wagons in order to meet the horse cost.

While Ostrup found that the trucks always delivered their rated capacity, in one case, in Washington, D. C., three trucks delivered 203 per cent of their capacity over an 8-month period in 1913, he also found that the cost of operation and repairs increased in undue proportion. From the reports of his lieutenants on the ground, Ostrup learned that this excessive cost was due to overloading, poor drivers and a lack of proper inspection. Ostrup had to keep well posted as to what his trucks were doing in Portland, Me., and in Denver, Colo., without himself going to either of these points. This he accomplished by the assist-

(Continued on page 30)

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# Chicago Balks at Front Fenders

## Big Users of Trucks Protest —Police Chief Ponders

CHICAGO, July 20—Fender agitation in the Windy City is high, owing to the fact that Chief of Police Healy has been unable to arrive at a decision as yet concerning definite action on the non-operative fender ordinance which was to have gone into effect in March.

Large truck users, truck manufacturers and the local motor trade association took a hand in the discussion today when they presented reports to Healy against the proposed enforcement of the fender law. No definite results were obtained. The Chicago Telephone Co., Armour & Co., the Consumers' Co., the Chicago Assn. of Commerce and the Chicago Automobile Trade Assn. Six fender manufacturers were also present, who formed themselves into an association called the Fender Mfrs. Assn.

Russel Huff, consulting engineer for the Packard company, sent a letter to the Automobile Trade association which was read at the meeting. This letter pointed out that it was not the front wheels that needed fenders, but the rear ones, quoting figures to show that 90 per cent of accidents in which the wheels pass over the victim it is the rear wheels and not the front ones which are involved. He also stated that trucks were only responsible for 50 per cent of the motor vehicle accidents, of which only 10 per cent were caused by front-wheel contact with the pedestrians. Of the accidents 10 per cent are caused by the pedestrians' own negligence.

Six fenders have been tested by a committee of three appointed by the chief of police and all have received the approval of the city. A seventh, the Hero, is shortly to be tested.

### $10 GA. FEE PROPOSED

SAVANNAH, GA., July 22—A bill has been introduced in the Georgia legislature to tax commercial vehicles of all kinds $10 per year, license fee. Representative Garland of Jones was sponsor for the bill. Dealers are to be charged $30. The proceeds are to be paid into the state treasury for distribution through a state highway commission or otherwise, according to the decision of the legislature.

### TRUCK WIDTH ST. LOUIS ISSUE

ST. LOUIS, July 23—Complaints have been made to the city that motor trucks of greater width than the law allows are being operated here. The law restricts widths of all vehicles to 10 feet.

### HORSEPOWER TAX IN NEW HAMPSHIRE

CONCORD, N. H., July 17—New Hampshire now has a different law governing motor trucks, the legislature at its session this year having changed the rating. Under the old law every non-passenger-carrying commercial vehicle and every motor truck of not more than 1 ton paid $10; of more than 1 and less than 2 tons, $12.50; of more than 2 and less than 5 tons, $15; of more than 5 tons, $20.

Passenger-carrying buses paid $10 regardless of horsepower or tonnage. Now the horsepower rating is in vogue and the rates are under 15 horsepower, $10; between 15 and 30 horsepower, $15; between 30 and 40 horsepower, $20; between 40 and 50 horsepower, $25; between 50 and 60 horsepower, $30; all over 60 horsepower, $40.

### CHICAGO WHEEL-TAX BACK

CHICAGO, July 15—Although the wheel-tax law was declared unconstitutional by the courts, Chicago will collect it again after July 20, a new law having been passed by the legislature which permits cities to levy local wheel taxes. The same ordinance which was previously operative will be inforced.

### SAFETY ZONES IN KANSAS CITY

KANSAS CITY, MO., July 23—Safety zones have been established on part of the downtown street crossings here, within which persons may wait for street cars without danger from motor cars. The zones are 8 feet wide and 55 feet long, taking in the front and rear entrances of the street cars. At first the zones were marked with two standards set 7 feet from the track nearest the curb line; later, lines of white paint were laid on the pavement, and it is possible that the standards will not be used.

Vehicles may drive by the safety zones between them and the curb at slow speed; on narrow streets they may follow street cars on the tracks. Heretofore motorists had to wait 10 feet behind cars taking on passengers, and there was frequently serious congestion.

### TEAM OWNERS WANT GRANITE BLOCK PAVEMENTS

PITTSBURGH, PA., July 17—Granite block pavements of the improved type have received the approval of the National Team & Motor Truck Owners' Assn. Especial discontent has been recorded with the wood block pavements that have been laid in recent years.

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| August..... | Sioux Falls, S. D., Tractor Show. |
| August 2-3..... | San Francisco, Tri-State Good Roads Assn., Third annual convention. |
| August 18..... | New York City, Monthly Meeting, Motor Truck Club of America, Automobile Club of America. |
| Sept..... | Peoria, Ill., Second Northwestern Road Congress. |
| Sept. 13..... | Oakland, Cal., Pan-American Road Congress. |
| Sept. 14-17..... | Kineo, Me., New England N. E. L. A. Convention. |
| Sept. 20-25..... | San Francisco, Cal., International Engineering Congress. |
| Sept. 24..... | Indianapolis, Ind., S. A. E., first section meeting. |
| Oct. 4-14..... | Wichita, Kan., Motor Exhibition, International Wheat Show. |
| Oct. 6-16..... | New York City, Electrical Exposition & Motor Show, Grand Central Palace. |
| Oct. 11-12..... | Dayton, O., National Paving Brick Mfrs.' Assn., annual meeting. |
| Oct. 18-20..... | Cleveland, O., Convention Electric Vehicle Assn. of America, Hotel Statler. |
| Oct. 19-20..... | Detroit, Mich., Safety First Convention, Safety First Federation of America. |
| Nov. 29-Dec. 4.. | Electrical Prosperity Week. |
| | 1916 |
| Jan. 29-Feb. 5... | Columbus, O., Motor Vehicle Show. |
| March 4-11..... | Boston, Mass., Motor Vehicle Show, Mechanics' Hall. |

# Truck Club Now for Users Only

## Owners Only Eligible Members in Future—Dues $25

NEW YORK CITY, June 22—Owners and operators of motor trucks will hereafter dominate the Motor Truck Club of America, Inc., by the common consent of its members given at the July meeting here last night. A resolution to amend the by-laws of the association has been before the membership for 3 months or more, and after repeated debate was put up to the vote of the club at the July meeting.

The resolution proposed two things, first, an increase in regular dues from $10 to $25, and second, restriction of membership to owners of motor trucks rather than to salesmen and the trade generally. The two propositions were voted on separately, the first being carried unanimously and the second after two ballots had been cast.

The by-laws amended were Sections 1, 2, 3 and 4 of Article 1, the article being further amended by the added Section 5. These now read as follows:

**Article 1—Membership**

Section 1—Applicants who are duly elected shall become members upon payment of the annual dues and subscribing to the constitution and by-laws.

Section 2—Active Members. The dues for active membership shall be $25.00 per annum. Dues shall be payable annually in advance on the anniversary of the date the first dues were paid. Active members only shall have the right to vote and hold office.

Section 3—Sustaining Members. Any person, firm or corporation represented by one member, contributing $50.00 or more to the treasury of the club, aside from its regular membership fee, shall be a sustaining member.

Section 4—Honorary Members. Honorary Members shall not be required to pay dues.

Section 5—Owners or operators of motor trucks only shall be eligible to election as active members, from the date of passage hereof. Manufacturers of motor trucks, dealers or accessories men shall not be eligible to election as active members from the date of passage hereof.

Two amendments to Section 5 which would have admitted a limited number of trade members on the strength of their being owners and operators of motor trucks were defeated. Especial emphasis was laid on the fact that while further enrolment of those in the trade was prevented, the trade members now on the lists, many of whom were charter members, are continued as full members. The status of honorary members is not changed, and there is nothing to prevent those in the trade from being elected honorary members.

The club discussed various local matters and went on record as favoring granite block pavements rather than asphalt on those sections of Broadway which are to be repaved owing to subway excavations.

### CORRECTED DENBY PRICES

NEW YORK CITY, July 26—Owing to a typographical error, the prices on Denby 1½- and 2-ton vehicles were incorrectly quoted in the last issue of THE COMMERCIAL VEHICLE. These prices are $1,685 and $1,985, respectively.

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# N. Y. County Forbids Truck Operation

## Action by Road Commissioners Is Unconstitutonal

ALBANY, N. Y., July 16—Highway commissioners of the towns of Otsego and Middlefield, Otsego county, New York, have each served the International Milk Products Co., Cooperstown, N. Y., with notices forbidding it from operating a 3½-ton G. M. C. truck over the roads in their respective jurisdiction.

The company's counsel has assured it that it was entirely within its rights in operating the vehicle over the public roads and that the commissioners were exceeding their authority in attempting to restrain it. Accordingly no attention has been paid to the notices. The International company states that its vehicles are so loaded that at no time does the total weight of the truck and its load exceed 8 tons.

The notice follows:

"To the International Milk Products Co., Cooperstown, N. Y.

"Please take notice, that you have been for several weeks last past and are now continuously and daily injuring the highways and bridges of the town of Otsego, Otsego County, N. Y., which highways and bridges are maintained at the public expense, by drawing, propelling and transporting over the same a large gasoline auto freight or milk truck of such weight and with loads thereon of such weight as has during all of said time and does now continuously and daily injure and destroy said highways and the culverts and bridges along the same and of such weight as has during all of said time and does now continuously and daily destroy, break and injure the surface of the improved state, county and town highways in said town of Otsego, Otsego County, N. Y., over which said auto truck has during all of said time and does now pass and repass; and you are and will be held responsible for all damages in connection therewith or resulting thereto, as provided in such cases by the laws of the State of New York.

"You are hereby forbidden from in any way drawing, propelling, transporting or otherwise operating said gasoline auto freight or milk truck upon any of the said highways or bridges in said town.

"Town of Otsego, Otsego County, N. Y.,
By Ceylon C. Ferns,
Town Superintendent of Highways
of said Town."

NEW YORK CITY, July 22—Acting at the request of the International Milk Products Co., Cooperstown, N. Y., and in co-operation with THE COMMERCIAL VEHICLE, Charles G. Bond, of the firm of Coulter & Bond, attorneys-at-law and counsel for the Motor Truck Club of America, today rendered an opinion applying to the following notice served by Ceylon T. Ferns, highway superintendent of the town of Otsego, N. Y., pointing out that according to Section 299 of the Highway Law the commissioner was not in any way authorized to take the step he has.

This law, which also follows, specifically forbids local regulation of the weights or speeds of vehicles; local taxation or registration; or restraining any vehicle from the free use of the public roads except when such roads shall have been especially designated for special purposes.

Counsel Bond renders the following opinion on this notice:

"While we have not been able to examine the law exhaustively and would not be able to do so without devoting some little time to it, we have looked at the highway law and from a cursory examination thereof we are of the impression that the superintendent of highways is transcending his authority when he refuses to permit a 3½-ton truck to use the highways of his town.

"The wording of Section 299 of the Highway Law, a copy of which we append, would indicate that he was not authorized on any account to regulate the weight of trucks. We would not say definitely, however, that this is so, for it is possible that he would be

(Continued on page 20)

### BAY STATE TRUCKS GAIN 2,950

BOSTON, July 18—That the motor truck industry is thriving in Massachusetts is shown by the activity in registrations for the first 6 months of this year. Compared to the same period of 1914 there is a gain of approximately 42 per cent. Last year from January to July there were 6,950 commercial vehicles listed in the Bay State. For the same period this year there were 9,900, a gain of 2,950. In fact, the gain is more evident by comparing the figures for the entire year of 1914 with the first 6 months of this year. All last year there were 8,236 commercial vehicles listed, which is 1,664 less than were registered up to now in the state. At the rate the registrations are going it would indicate that at least 11,500 trucks would be registered this year, or about 30 per cent more than last year.

### NEW PARCEL POST SYSTEM

COLUMBUS, O., July 16—A radical change has been made by Postmaster Kinnear of Columbus, O., in the methods of collecting mails and delivering parcel post packages by motor truck. Heretofore it has been the plan for the government to give $900 yearly to each collector for the maintenance of his machine.

Under the new plan, which became effective July 1, the collection and delivery will be done under contract with Councilman William J. Lucks. In all, ten trucks have been equipped with a special body designed by the postmaster. The body is arranged to permit of special hampers which can be removed and the car placed in service at once.

T. W. Rankin has erected a garage near the post office for the housing of the automobiles. It is known as the Federal Garage.

### EXHIBIT 18 FARM TRACTORS

SIOUX FALLS, IA., July 24—Eighteen makes of farm tractors are to be exhibited at the tractor show here the third week in August. The exhibitors are: Avery Mfg. Co., Bull Tractor Co., J. I. Case Plow Co., J. I. Case Threshing Machine Co., C. O. D. Tractor Co., John Deere Plow Co., Emerson-Brantingham Co., Farm-horse Tractor Co., Helder Mfg. Co., Huber Mfg. Co., International Harvester Co., Lininger Implement Co., La Crosse Implement Co., Nilson Farm Implement Co., Oliver Chilled Plow Co., P. & O. Plow Co., Peoria Tractor Co., Rock Island Plow Co., Simplex Tractor Co.

# Little Giant Six-wheeled Truck

## Unique Semi-trailer Applied to Standard Trucks

CHICAGO, July 17—The Chicago Pneumatic Tool Co., of this city, builder of the Little Giant truck, has made arrangements with the Trailer Transportation Co., New York City, to produce a six-wheeled truck or tractor-semi-trailer unit of the type formerly produced by the Trailer Transportation Co. This device, described in THE COMMERCIAL VEHICLE of April 1, 1915, consists of a trailing axle on a fifth wheel and a body loosely mounted on the truck platform.

The arrangement differs from other semi-trailer devices in that no fifth wheel or turning pivot is used on the truck itself, and no draft is transmitted through the body itself, a pivoted draw-bar pulling the cradle above the trailer fifth wheel upon which the rear end of the body rests.

The rearmost wheels trail accurately with the middle wheels, and the vehicle backs correctly. It will turn in the same radius as the truck alone. On a test run the vehicle ran from Philadelphia to Baltimore, 107 miles, in 7 hours 38 minutes. It will turn in 36 feet and will carry lumber 40 feet long.

### HANNIBAL TRUCK, $500

HANNIBAL, MO., July 17—A light commercial vehicle to sell at $500 is shortly to be produced by the Hannibal Wagon Co., this city, which claims to have orders for 100 already. The vehicle will have a special motor which is being built in Detroit. An addition to the plant is being made to accommodate the new business.

### BELL 1,200-POUNDER

YORK, PA., July 20—The Bell Motor Car Co., the newest motor vehicle builder in York, has announced a 1,200-pound truck to be built upon the same chassis as its touring model except that it will have a lower gear-ratio and a Bosch magneto instead of the Atwater-Kent ignition system. It has a 112-inch wheelbase with bevel drive through the springs.

### LAURA 1,000-POUND TRAILER

COLDWATER, MICH., July 20—J. F. Laura has patented a draw-bar for a trailer and is shortly to produce a trailer of 1,000 pounds capacity.

### ¾-TON REO ANNOUNCED

LANSING, MICH., July 27—Model F Reo, a 1,500-pound delivery vehicle which has been hanging fire for some time, has been announced by the Reo Motor Truck Co., of this city. An experimental model was exhibited at the last Boston show, but the vehicle has not been announced until now.

It is priced at $1,000 for the chassis and $75 extra is charged for the standard open express body and equipment. It has a wheelbase of 120 inches and the standard body is 96 by 44 inches. It is electrically started and lighted, a Remy system being used. The motor is 4½ by 4½, pair-cast. Tires are 34 by 4½ pneumatic all around.

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# Must Ship Trucks Minus Tires

## Britain Protests Violations of Rubber Guarantee.

NEW YORK CITY, July 27—The Rubber Club of America has been warned by the British government against the practice of American builders in shipping trucks equipped with rubber tires to neutral countries.

According to the agreement between the rubber manufacturers and the British government the Americans must guarantee to ship tires only through England to neutral countries and with a license from the British War Trade Dept. in London. Up to now these arrangements have worked out well, and a plentiful supply of crude rubber has been available to American rubber factories in the United States.

### RUSSIAN FIELD PROMISING

PETROGRAD, RUSSIA, July 10—The Poheda Commercial House, located here, announces that there will be a large demand for motor trucks in Russia at the cessation of hostilities. The business formerly done with Germany, it is stated, will not be resumed, and the United States should be in a good position to get her share of the trade. The Poheda Commercial House is located at 61 Moika, Petrograd, and is represented in America by Ladenburg, Thalmann & Co., New York City.

### GERMAN TRUCK OUTLOOK

BERLIN, GERMANY, June 5—The *Automobilwelt*, the German motor trade journal, devotes its space in a current issue to a discussion of the probable effects of the war on motor truck building after peace is established. It states that the demand for motor trucks will increase after the war owing to the scarcity of labor and the great amount of reconstruction work to be carried on.

Horses will also be scarce and dear, it goes on to say, so that they will be extensively replaced by motor vehicles.

The military subsidy system will be still further extended and is looked upon as one of the greatest potential factors for the more widespread adoption of motor haulage equipment. More specialized manufacturing of motor vehicles and greater standardization are also predicted.

### FIVE WAR TRUCKS DAILY

HARRISBURG, PA., July 26—Five armored motor trucks daily are being built by the Morton Truck & Tractor Co., of this city, on an order for 1,400 recently received from the Russian government. Part of the contract has been let to the Baldwin Locomotive Wks., Philadelphia. Thirty machines will be shipped this week, the Russian inspectors having arrived to inspect the trucks before shipment. A bonus is to be paid, it is said, if deliveries are up to schedule.

### STANDARD BECOMES WARREN

WARREN, O., July 16—Taking over the plant and property of the Standard Motor Truck Co. of Ohio, the Warren Motor Truck Co., of this city, has been established to carry on the manufacture of the erstwhile Standard of Ohio trucks. R. B. Wick has been elected president; C. B. Loveless, vice president; L. L. Jones, secretary; C. C. Braden, treasurer, and D. M. Bell, general superintendent. R. B. Wick, William Wallace, D. L. Holman, R. A. Cobb, C. B. Loveless, C. C. Braden and G. F. Proctor have been made directors.

### BENZOL PLANT PLANNED

SHARON, PA., July 22—Benzol, which heretofore has not been extensively manufactured in the United States, will be made on a large scale by the Carnegie Steel Co. at its plant in Farrell, Pa. Material for the construction of the plant is being sent by express to hurry its completion.

### NEW S. A. E. DATA

NEW YORK CITY, July 27—Additional data sheets have been issued by the Society of Automobile Engineers. These comprise seventy-two new sheets, thirty-five for Volume I and thirty-seven for Volume II.

These sheets contain standard designs and dimensions for various details of construction, such as yoke and rod ends, pin dimensions, large hexagonal spark plug shells, large-diameter thread pitches, standard sizes of pneumatic tires, side-outlet carburetor flanges, etc. Conversion tables for grade percentages and angles in degrees, for A. L. A. M. horsepower, piston displacement tables, crank-angles to piston position, altitude and horsepower development, diametrical and circular pitch, and decimals of millimeters to thousandth-inches.

### S. A. E. MEN ON DEFENSE BOARD

Secretary Daniels of the Navy for his naval defense board has made a request for two motor vehicle engineers to the Society of Automobile Engineers. The council of the society has asked for the aid of the governing committee of the sections in choosing the two representatives.

This move on the part of the defense board, of which Thomas A. Edison is chairman, is taken to indicate that this government will not fail to recognize the importance of motor vehicles in a modern defense plan.

### 424 TRUCKS IN COLORADO

DENVER, COL., July 16—Registrations of motor trucks in Colorado during the first 6 months of 1915 show that there are 424 trucks in use, excluding those licensed by dealers, made up of 387 gasoline vehicles and thirty-seven electrics. Of these, 308 gasoline and thirty-three electric trucks are owned in Denver and vicinity.

## Accessory Jobbers Assn.

### N. A. A. J. Talks Trade Evils and Permits Appliance Makers to Join

CHICAGO, July 21—The National Assn. of Accessory Jobbers, recently formed here, at its first mid-summer session, terminated today, discussed many topics in connection with the motor vehicle accessory business and arranged for manufacturer memberships as well as jobber memberships.

The meeting was attended by more than 100 representatives of the trade and discussed mail-order house competition, program advertising, dead accounts losses, distinctions between jobbers and dealers, reversed telephone charges, parcel post, express and freight matters, and returned goods.

# Street Railway Starts Jitney Line

## Baltimore Traction Firm Buys Twenty-five Garfords.

BALTIMORE, MD., July 24—The Baltimore Transit Co. has been formed by the United Railways & Electric Co. to operate motor buses for the purpose, according to President William A. House of both companies, of determining whether or not the motor bus is a desirable supplement to the street car system. The new concern is incorporated with a capital of $100,000. William H. McKee, of Philadelphia, is its manager.

Twenty-five Garford buses have been ordered, ten of which have been delivered and five more of which will be shipped July 31. They have Brill twelve-passenger bodies.

### KANSAS CITY BUSES FAIL

KANSAS CITY, MO., July 23—Fifteen buses of the Kansas City Jitney Transportation Co., bought in May from the Studebaker Corp., were taken back by that company on foreclosure of the mortgage July 17. These vehicles had been operated on regular bus schedules, as recounted on pages 19 and 20 of this issue. A large force of officials, drawing high salaries, and heavy rentals for too-centrally-located garage space were among the causes ascribed for the failure to lay by a sinking fund.

Reorganization is anticipated, however, and the officials hope to get the buses back into service. They have run about 15,000 miles with the tires only showing the effects of serious wear. Other Kansas City jitney lines have raised their fares to 10 cents.

### 1915 UNITEDS ALL GONE

GRAND RAPIDS, MICH., July 24—The United Motor Truck Co., of this city, has sold out its 1915 output of motor trucks and is building additions to its plant for next season's business.

### UNIVERSAL REHABILITATED

DETROIT, July 17—A new plant has been secured by the reorganized Universal company for the manufacture of Universal 1½-, 2- and 3-ton trucks. The Universal Service Co. is the name of the concern and Charles P. Derr is its president.

### NEW ALL-DRIVE TRUCK

GOSPORT, IND., July 24—A four-wheel-driven-and-steered motor truck has been constructed and patented here by Claud Hoadly, the feature of which is chain drive to all wheels. The front and rear axles are rigid, turning on fifth wheels instead of having steering knuckles at the wheels. The jackshafts are also carried by the fifth-wheel elements, being driven by bevel gears concentric with the king-bolts. A rack-and-pinion device steers the axles. Hoadly's patent is No. 1,027,730.

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Kansas City, Mo.
Twelfth street, east of Grand; jitneys approaching original station on Grand, whence Kansas City Jitney Transportation Co. and Eastbound jitneys leave

# New Western Bus Lines Profit By Eastern Mistakes

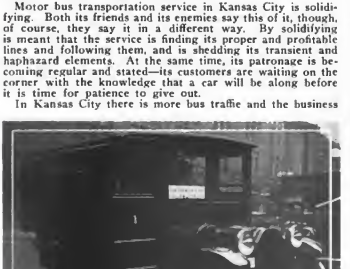
## Kansas City's Conditions Compared With Capital's

KANSAS CITY, claimed to be the cradle of the modern jitney bus, is developing its motor transit along lines of larger buses or more uniform types, operated on fixed schedules and routes; and toward centralized ownership or control. Washington's historic motor Herdic line is on the verge of discontinuance.

The successful Kansas City lines are independent of the street cars, the vehicles are light and swift and they are one-man operated for economy. The Washington buses were perhaps too large for satisfactory speed, a ruinous street car transfer system made profits impossible and two-man operation made operating cost excessive.

Motor bus transportation service in Kansas City is solidifying. Both its friends and its enemies say this of it, though, of course, they say it in a different way. By solidifying is meant that the service is finding its proper and profitable lines and following them, and is shedding its transient and haphazard elements. At the same time, its patronage is becoming regular and stated—its customers are waiting on the corner with the knowledge that a car will be along before it is time for patience to give out.

In Kansas City there is more bus traffic and the business has grown very greatly in the past 60 days. Three big routes are now covered on the boulevards: One on Harrison, one on Linwood and one on the Paseo, all merging into McGee Trafficway, and all serving about the same southeastern section of the residence district. There are about thirty large buses on these routes, fifteen of which belong to the Kansas City Transportation Co. and twelve to the White Star line, the buses of the latter being individually-owned but co-operating in the maintenance of schedules. There are other buses that carry passengers on other routes, about twenty serving the eastern district of the city.



One of the 15 twelve-passenger Studebaker buses of the Kansas City Transportation Co. No more than twelve are allowed on these buses

### Touring Cars for Special Runs Only

There are still many small cars in the service; it does not seem that the number has been materially reduced, but the tendency now seems to be to run the touring cars as a special and not to confine them to fixed routes. This course produces more revenue in that it allows the charging of an advanced fee.

The buses charge 5-cent fares, while 10 cents is frequently charged by the touring cars for such short hauls as the mile to the Union Station, and larger fees for special hauls, or for only one passenger. The touring cars help to get the crowds downtown in the morning and home in the evening, at the 5-cent charge. But during the light hours of the middle of the day they cater to the public's special needs at rates that only by courtesy entitle the cars to be classed as jitneys.

The Kansas City Transportation Co., organized by W. H. Miller for the purpose of establishing jitney bus service on regular routes and schedules, has now fifteen cars in service, and five more cars are now being painted and prepared to enter as soon as the need appears. These cars are Studebakers. The original plan provided for forty of the buses; but the others will be delivered only as those on the streets prove profitable.

The company maintains a traffic manager at the downtown station, Twelfth street and Grand avenue, in the rear of a small restaurant. All the cars stop at this station and leave on the dot. The stopping place is about 20 feet north of the corner of Twelfth street, on the east side of the street; the cars enter from Twelfth, bound from the east, and exit on Grand to Eleventh, east on Eleventh, south on McGee to the trafficway. The cars do not loiter on the street, but pick up passengers at corners or in the middle of blocks. Morning and evening these cars are crowded; during the day they are often empty throughout the entire round trip.

The White Star line is the result of the effort of several bus owners to get in on regular schedules. An attempt was made to organize an association that would include the Kansas City Transportation Co., the touring cars, and the other buses, but the effort was unsuccessful. It seems lamentable

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Republic bus, twenty passengers, in independent service, Kansas City, Mo. One that like many others cannot run on schedule because of the lack of general co-operation among jitney owners

that in Kansas City, the scene of the organization of the national association, this failure should have occurred.

The officers have prepared schedules for the operation of the cars on two boulevard routes with a common terminal at the middle of the block between Twelfth and Thirteenth on Grand, west side; and a common terminal at the other end, Forty-sixth street and the Paseo, or the entrance to Electric Park. This terminal is two blocks from the south end of the Kansas City Jitney Transportation Co.'s route.

### 4-Minute Service

The White Star buses leave the southern terminal every 4 minutes in the morning; the city terminal every 4 minutes in the afternoon. During the day 6-minute service is maintained, thus giving each driver a chance during the day to overhaul his car.

Each driver or owner pays the starter, J. W. Saunders, 25 cents a day for his services, and as there are twelve cars now, his income therefore is $3 a day at present. He assists in loading the cars and in seeing that the cars leave on schedule and in their proper order.

Each driver upon associating himself with the White Star line deposits $5, from which fines are taken. Drivers are fined $1, for instance, when they fail to appear on schedule, in the morning or afternoon; when cars are not in proper condition for operating, or are not clean, and for other delinquencies.

Each car seats twelve to twenty-five passengers, and they are not overloaded. During the day the travel is light, but the service, as in the case of the buses of the Kansas City Transportation Co., is dependable and many regularly take these buses for the trip downtown and back. The schedules are maintained fairly well even in the worst of stormy weather. Drivers must report by telephone if they cannot bring their cars. Saunders is on duty from noon until midnight; the schedules run from 6.30 a. m. to midnight.

The following cars are associated in the White Star line, each having a number painted on the big white star on the front of the car:

### Associated Kansas City Buses

1—Great Eagle, sixteen-passenger.
2—Packard, fourteen-passenger.
3—Oldsmobile, fourteen-passenger.
4—Pierce-Arrow, fourteen-passenger.
5—Federal, twenty-five-passenger.
6—Overland twelve-passenger.
7—Oakland twenty-passenger.
8—Pierce-Arrow, fourteen-passenger.
9—Overland, twelve-passenger.
10—Wilcox, eighteen-passenger.
11—Commerce, twenty-passenger.
12—Buick, eighteen-passenger.

About the most reliable showing as to the growth of the jitney transportation service in Kansas City is to be found in the public statement made recently by John H. Lucas, chief counsel for the Metropolitan Street Railway Co., that the daily income of the traction company had been impaired to the extent of $2,500 a day by the jitneys. This means a loss of 50,000 pay passengers daily, or about 15 per cent of the business of the street railway. Judge Lucas made the statement before the state board of equalization, where he appeared for the purpose of keeping down the corporation's taxes.

The city council of Kansas City, Mo., is now working on an ordinance to regulate jitneys. Jitney owners recognize that something of the kind is necessary and desirable. The first laws proposed were extremely onerous to jitneys, requiring bonds and various things that would probably have driven most of the owners out of the business. The reaction against this drastic measure has resulted in a lull in interest, and it seemed for a time that the city administration was waiting for the jitney enterprise to die out and so avoid the difficulties of framing an ordinance that would be satisfactory alike to public, jitney owners and all interests.

The measure now being developed will probably require a license tax to go to the maintenance of streets, make regulations as to the stopping places of jitneys, and their operation, and possibly require a bond of some kind.

### Association Work

While Kansas City has been getting regular service on schedules from the bus lines, and much, though irregular, service from touring cars, without organization, Springfield, Mo., and St. Joseph, Mo., have been getting regular service with the active operations of local jitney associations. Touring cars have been used chiefly in these cities, though the Springfield enterprise is now blossoming into the bus class.

Topeka, Wichita, Atchison and smaller towns of Kansas have jitney lines of more or less service and activity. Oklahoma, particularly Muskogee, has many jitney lines, operating profitably and with satisfaction to the public.

The jitney interurban service is developing even more rapidly than the city service, and there seems to be a wider open field, as well as a natural need, in that field. The most striking instance of jitney interurban needs is in the Joplin district, where the president of the Southwest Missouri Railway Co., a local and interurban electric, has founded a jitney service, or rather taxi service, as auxiliary to the electric line.

Around St. Joseph, Mo., there are several enterprises of similar nature in operation and projected. The Studebaker combination truck and passenger bus is popular for the interurban and rural service in that community.

There are several goodly villages where railroad connections with St. Joseph are inadequate. The cars now run between St. Joseph and two of these villages. This summer new routes will be established, including other towns in a radius of 15 miles and providing facilities for the people in these communities to reach St. Joseph in the morning and return the same evening. The same cars can also carry produce from the gardens, and can bring back goods from the city stores. Motor cars are already in service at two towns 8 and 10 miles from the St. Joseph interurban running to Kansas City, bringing passengers to the interurban station.

### Street Car Feeders

The terminals of the Metropolitan Street Railway, which extends into the rural districts on some lines, seem likely to be the town-ends of several bus lines. Six years ago the Renick bus line, operated with horses, established service

Eighteen-passenger Buick bus. C. W. Hjort, owner. On White Star schedule. Kansas City, Mo.

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to the nearest street car in Kansas City to Leeds, Mo., about 2 miles.

When the Twenty-seventh street car line was extended to Lister avenue, the bus line made that terminus its station; and a year ago changed to motor buses. Ray Renick, proprietor and driver, has a special body built in which he carries twelve passengers and maintains a regular schedule, half-hourly. It takes him 15 minutes to make a one-way trip, and he can squeeze in an extra trip on necessity.

Leeds is a thriving suburban town and has good railroad connections with Kansas City. It has sheep yards where hundreds of thousands of sheep are fed each year, held there for filling after their long trip from the far west, and then taken on to the Kansas City stock yards. The farmers who bring the stock now take the interurban jitney to the city street car and ride through the city to the yards, when their stock goes to market. The fare is 10 cents.

Six miles beyond Leeds from Kansas City is Raytown, another large village, which now has a jitney service to Kansas City over the rock road to the end of the Twenty-seventh street car line. This is a touring car service and the fare is 20 cents.

### Costly Competition

South of Kansas City the co-operation between bus lines and the Metropolitan Street Railway is not so complete. A bus makes about three trips a day on the average between Belton, Mo., 20 miles, and Kansas City, but the bus has its city terminus in the center of town. For more than 6 miles it runs in the city over practically the same route as the Dodson city line, and the owner therefore has had to adjust his charges to this competition. The only reason he comes into town is for the advertising; and if he were sure that he would get the custom he would stop at Dodson. Eventually an arrangement probably will be made by which the traveling public can be kept aware of the service he will offer from Dodson to Belton and he can save the long trip into town and make more money net than he is now.

Two bus lines are operating out of Independence, Mo., 9 miles from Kansas City, bringing people from the small settlements and from the rural homes to the Independence street cars.

A motor bus line was established recently from Parkville, Mo., into Kansas City, which is doing a thriving business. Parkville is a college town and the bus is patronized on the morning trips in by people who work or have incidental business in Kansas City, on the outgoing trip by students and visitors to the college.

Through Kansas there are several such interurban motor services and service from the small towns to the larger. But Kansas has not developed the enterprise as fully as Missouri. One reason is that there are fewer sizable towns; another is that everybody in Kansas is currently reported to have a motor car of his own.

Garford-Utility bus used in Kansas City

The Metropolitan Coach Co. was one of the first to establish a motor bus line in the United States, its buses being operated in the northwest residence section of the city.

The company has made a report to the Utilities Commission of the District of Columbia which shows some very interesting figures. It is a corporation organized under the laws of the District of Columbia, with a capital stock of $25,000. S. Dana Lincoln is the principal stockholder and is president of the company. No dividends have been paid on the stock.

The amount invested in equipment was given December 31, 1914, as $39,656.21. All told, the company has a bonded indebtedness of $109,477.35.

### Forced to Take Transfers

The revenues of the company for the year 1914 are given as $34,637.06 received from passengers, and $400 received from advertising in the cars, a total of $35,037.06. The company is compelled by law, the same as street car companies operating in the District, to sell six tickets for a quarter, and is compelled to receive transfers from and give transfers to the street car lines. Mr. Lincoln recently asked the commission to allow him to charge a straight 5-cent fare, but this permission was not granted.

The expenses of operation are tabulated below under the heads of Equipment, Conducting Transportation, and General and Miscellaneous expenses:

| | | Ratio to General Account | Ratio to Total Operating Expenses |
|---|---|---|---|
| **Equipment:** | | | |
| Maintenance of cars, tire expense, breakage, etc. | $2,248.13 | 30.42 | 5.77 |
| Maintenance of electric equipment motors, etc. | 5,140.63 | 69.58 | 13.19 |
| Total equipment | $7,388.96 | 100.00 | 18.96 |
| **Conducting Transportation:** | | | |
| Superintendence of transportation—Official's salary | $900.00 | 4.15 | 2.30 |
| Fuel for power, oils and gasoline | 8,033.32 | 37.02 | 20.61 |
| Conductors and motormen | 12,765.66 | 58.83 | 32.77 |
| Total | $21,698.98 | 100.00 | 55.68 |
| **General and Miscellaneous:** | | | |
| General expenses including clerk hire, etc. | $4,362.46 | 44.15 | 11.20 |
| Injuries and damages, lawyers' fees and costs | 240.25 | 2.44 | 0.62 |
| Insurance | 315.00 | 3.19 | 0.81 |
| Stationery and printing | 221.60 | 2.25 | 0.57 |
| Rent of office | 540.00 | 5.47 | 1.39 |
| Rent of equipment | 4,200.00 | 42.50 | 10.77 |
| Total | $9,879.31 | 100.00 | 25.36 |
| **Recapitulation:** | | | |
| Equipment | $7,388.96 | | 18.96 |
| Conducting transportation | 21,698.98 | | 55.68 |
| General and miscellaneous | 9,879.31 | | 25.36 |
| Total operating expenses | $38,967.05 | | 100.00 |

Under General and Miscellaneous expenses is an item of $4,200 for rent of equipment during the year 1914. This refers to the six new cars which the company put in operation 2

# Cost Study Bares Bus Snags

## Analysis of Financial Report of Failed Washington Motor Bus Line

JITNEY, being a word synonymous with nickel, the jitney bus is necessarily a 5-cent bus. Obviously then, every motor bus is not a jitney, or need every motor bus operate on a 5-cent basis. In some cases a 5-cent fare means ruin for the operator, in other cases neat profits are gleaned.

In THE COMMERCIAL VEHICLE of July 15, 1915, the failure of the Metropolitan Coach Co., Washington, D. C., the motorized Herdick line of old, was announced. Inquiry into its financial condition is interesting. The line consists of six large buses, which took the place of four smaller cotes of another make which had been in successful operation for 6 years. To the superstitions it may be of interest to note that the difficulties of the company began with the acquisition of the six large buses, these being part of the fleet which previously failed in Pittsburgh, Pa.

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years ago. The six older cars, of smaller capacity, are kept for emergencies.

It is to be noted that a motorman and conductor are employed to operate each car, the same as on street cars. The salary list consists of twelve conductors at $9 per week, eleven motormen at $13 a week, one inspector who draws $16.10, one machinist at $20 per week, two other shop employes at $9.75 each, an auditor at $780 a year, and a general superintendent at $900 a year. The president is supposed to draw $3,600 a year, but at present his salary is carried as a liability.

With receipts then at $35,037.06, and operating expenses at $38,967.05, the business showed a loss in 1914 of $3,929.99. Then there should be added to this taxes, $252, interest on funded debt, $6,568.64, interest on equipment, $525.45, or a total loss of $11,276.08. Nothing is charged off for depreciation. This should not be done on the rented cars, but is an item which should be considered on the cars the company owns.

The loss was not so great the previous year, 1913, as a profit of $1,080 was shown, if operating expenses alone are considered, nothing charged off for depreciation, taxes and interest. Twenty-six per cent for depreciation is charged off on the equipment of the taxicab companies of Washington.

This local figure is useful as reflecting the actual road conditions and their effect.

The commission has made an interesting analysis of the figures, which shows:

| | | |
|---|---|---|
| Passenger car-mileage | 286,509 | |
| Passenger car-hours | 36,058 | |
| Regular fare passengers carried | 812,792 | |
| Free transfer passengers carried | 385,241 | |
| Total passengers carried | 1,198,033 | |
| Passenger revenue, nickels and tickets | | $34,639.06 |
| Average fare, revenue passengers | | .042815 |
| Average fare of passengers, including transfers | | .028912 |
| Total revenue from transportation | | $34,637.06 |
| Revenue from transportation per car-mile | | .12082 |
| Revenue from transportation per car-hour | | .96059 |
| Revenue from operations other than transportation, $400 for advertising | | $400.00000 |
| Revenue from operations other than transportation, per car-mile | | .001396 |
| Revenue from operations other than transportation, per car-hour | | .011093 |
| Total operating revenue | | $35,037.06 |
| Operating revenue per car-mile | | .12229 |
| Operating revenue per car-hour | | .97158 |
| Total operating expenses | | $38,967.05 |
| Operating expenses per car-mile | | .13600 |
| Operating expenses per car-hour | | 1.0806 |

Had the company not been required to carry passengers free on transfer from other lines it is highly probable that the books would have balanced on the other side of the ledger, not because the elimination of non-paying traffic would have lessened the operating cost—the same number of miles would have had to be run—but because these passengers would in all liklihood have paid an extra fare or ridden the entire distance on street cars. In either case the buses could have been loaded to capacity with paid fares. Instead of this, passengers who would have paid a 5-cent fare were crowded out by non-paying passengers.

No figures are available to show whether an equal number of passengers transferred from the buses to the street cars as from the cars to the buses, but unless the number were equal, an injustice was done. That it was equal is highly unlikely in view of the fact that the Metropolitan company had to install buses of greater capacity, thus pointing out an excess of traffic which could not be economically handled by a large number of smaller buses because of the low average fare—2.9 cents.

If it was unequal it would seem that in all justice the commission should have allowed the bus company to issue a distinctive form of transfer to be redeemed by the bus company, the street car company in turn redeeming all of its transfers collected by bus conductors.

### Cash Fares Would Have Made Profit

Had all of the fares collected been cash or tickets the bus company would have shown a profit for 1914 instead of a loss. At an average paid fare of 4¼ cents, the 385,241 transfer passengers would have paid in $16,372.74, which would have covered the $11,276.08 deficit with $5,096.66 over. Interest at 26 per cent on the investment would be about $2,276.97, figuring back from the interest figure given, leaving $2,819.69 profit for the president.

Modern one-man bodies would have saved $5,616 in addition to the above, paid out at $9 per week to conductors.

In an effort to relieve the situation, Mr. Lincoln a short time ago applied to the commission for permission to issue $150,000 in 6 per cent bonds. The commission refused to allow him to issue bonds to cover past failures, but offered to allow him to issue bonds in a smaller amount. Realizing the futility of this, he stopped the buses.

# New York County Forbids Truck Operation

## Action by Road Commissioners Is Unconstitutional

(Continued from page 15)

upheld if he made a reasonable regulation as to weight. The court would have to decide as to how much weight the highways could reasonably stand. Our own impression is that a 3½-ton truck is not an unreasonable load, and any attempt by the superintendent of highways to prevent the use of the roads by such a truck we would regard as an unwarranted exercise of authority.

"Of course, if the superintendent prevents the use of such trucks, the only remedy would be recourse to the courts, probably by injunction."

Section 299 of the Highway Law, to which Mr. Bond refers in his opinion, follows:

SECTION 299
OF
HIGHWAY LAW OF NEW YORK STATE

"Local Ordinances Prohibited

"Subject to the provisions of this article, local authorities shall have no power to pass, enforce or maintain any ordinance, rule or regulation requiring of any owner or operator of a motor vehicle any license or permit to use the public highways, or excluding or prohibiting any motor vehicle whose owner has complied with sections 282 to 290*, both inclusive, of this article from the fee use of such highways, except such driveway, speedway or road as has been or may be expressly set apart by law for the exclusive use of horses and light carriages, or except as herein provided, in any way affecting the registration or numbering of motor vehicles or prescribing a slower rate of speed than herein specified at which such vehicles may be operated, or the use of the public highways, contrary to or inconsistent with the provisions of this article; and all such ordinances, rules or regulations now in force are hereby declared to be of no validity or effect; provided, however, that the local authorities of cities and incorporated villages may limit by ordinance, rule or regulation hereafter adopted the speed of motor vehicles on the public highways, on condition that such ordinance, rule or regulation shall also fix the same speed limitation for all other vehicles, such speed limitation not to be in any case less than 1 mile in 6 minutes in incorporated villages, and on further condition that such city or village shall also have placed conspicuously on each main public highway where the city or village line crosses the same and on every main highway where the rate of speed changes, signs of a sufficient size to be easily readable by a person using the highway, bearing the words "Slow down to — miles" (the rate being inserted) and also an arrow pointing in the direction where the speed is to be reduced or changed, and also on further condition that such ordinance, rule or regulation shall fix the penalties for violation thereof similar to and no greater than those fixed by such local authorities for violations of speed limitation by any other vehicles than motor vehicles, which penalties shall during the existence of the ordinance, rule or regulation supersede those specified in sections three hundred and seven, three hundred and eight and three hundred and nine of this article, and provided further, that nothing in this article contained shall be construed as limiting the power of local authorities to make, enforce and maintain, further ordinances, rules and regulations, affecting motor vehicles which are offered to the public for hire.

*Sections 282-290 inclusive referred to above deal with the method of registration of motor vehicles, 290 exempting non-resident owners from such registration.

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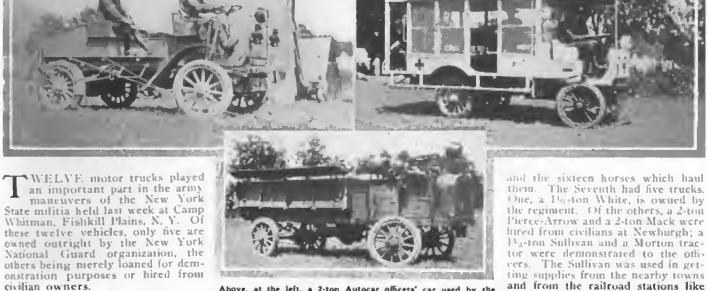
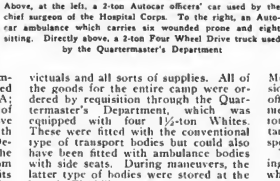
# Trucks Practice with Empire State Guard





Above, at the left, a 2-ton Autocar officers' car used by the chief surgeon of the Hospital Corps. To the right, an Autocar ambulance which carries six wounded prone and eight sitting. Directly above, a 2-ton Four Wheel Drive truck used by the Quartermaster's Department

TWELVE motor trucks played an important part in the army maneuvers of the New York State militia held last week at Camp Whitman, Fishkill Plains, N. Y. Of these twelve vehicles, only five are owned outright by the New York National Guard organization, the others being merely loaned for demonstration purposes or hired from civilian owners.

During the week from July 10 to 17, the camp was composed of approximately 5,000 officers and men made up of the Quartermaster's corps; four regiments, the Seventh, Twelfth, Sixty-ninth and the Seventy-first; three troops of cavalry composed of a squad of the Second United States cavalry regulars and Squadron A; a hospital corps and four companies of regular infantry. Each of the above units remained in camp for 8 days with the exception of the Quartermaster's Department, which was permanent for the entire maneuvers. These lasted from July 17 to August 1. The other units were replaced from week to week by different regiments from other parts of the state.

The forces were divided into two groups, the Reds and the Blues, which fought battles from day to day under assumed war conditions, including cross-country marches and attacks on intrenched positions. In these, the motor trucks played no part at all with the possible exception of a motor ambulance and a chief surgeon's truck. This was not because the trucks were unsuited to the work but because the officers in charge failed to apply the lessons learned in the use of trucks in the present war abroad.

The main function of the trucks was to keep the encampment well stocked with victuals and all sorts of supplies. All of the goods for the entire camp were ordered by requisition through the Quartermaster's Department, which was equipped with four 1½-ton Whites. These were fitted with the conventional type of transport bodies but could also have been fitted with ambulance bodies with side seats. During maneuvers, the latter type of bodies were stored at the base in Fishkill.

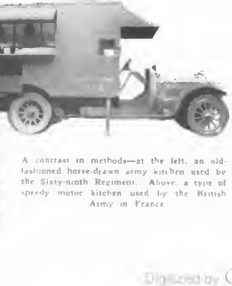
A 2-ton Four Wheel Drive truck belonging to the Quartermaster's Department was also in camp.

These vehicles were indispensable in getting the rations and supplies from the Fishkill Plains railroad station and from the nearby farms. At one time, two carloads of hay for the horses at camp were delayed in arriving and the supply on hand was almost exhausted. Several tons of hay were purchased from a farmer 5 or 6 miles away and the trucks used to haul it into camp.

Of the four regiments encamped during the week ending July 17, only one, the Seventh, had motor trucks in addition to the four army transport wagons and the sixteen horses which haul them. The Seventh had five trucks. One, a 1½-ton White, is owned by the regiment. Of the others, a 2-ton Pierce-Arrow and a 2-ton Mack were hired from civilians at Newburgh; a 1½-ton Sullivan and a Morton tractor were demonstrated to the officers. The Sullivan was used in getting supplies from the nearby towns and from the railroad stations like the Whites of the Quartermaster's Department. The Morton was tried out hauling five of the regular army transport wagons at a time over all kinds of muddy and sandy ground. With its large steel-tired wheels, the Morton made a very favorable impression, although it was the opinion of the officers of the Quartermaster's Department that trucks of not greater than 1½ tons capacity were best suited to military maneuvers because of their greater speed and mobility.

The only other unit at the camp during the 8-day period ending July 17 which used trucks was the hospital corps. This department had three 2-ton Autocars on demonstration. One was a two-seated officer's car used by the chief surgeon; another an ambulance and the third a searchlight truck. The ambulance was of the same type as that furnished to the Canadian contingent which embarked for England at the beginning of the war. It has stretchers for six wounded and can carry eight sitting.

The searchlight truck was equipped with a direct-connected motor-driven generator in the body of the vehicle which supplied current for two 5,000-candlepower searchlights.



A contrast in methods—at the left, an old-fashioned horse-drawn army kitchen used by the Sixty-ninth Regiment. Above, a type of speedy motor kitchen used by the British Army in France

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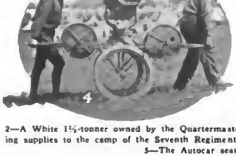
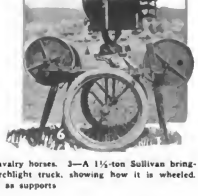
# With the Motors of the Militia at the Fishkill Maneuvers

1—One of the poor roads in the camp at Fishkill Plains, with a Quartermaster's truck in the background





2—A White 1½-tonner owned by the Quartermaster's Department bringing a load of hay into camp for the cavalry horses. 3—A 1½-ton Sullivan bringing supplies to the camp of the Seventh Regiment. 4—One of the portable searchlights of the Autocar searchlight truck, showing how it is wheeled. 5—The Autocar searchlight truck. 6—The searchlight set up, with the handles as supports

7—A squad of the Reds stealing up on the entrenched positions of the Blues in the battle of July 16. The trenches of the Blues are to the left, but not shown in the picture. The defenders' artillery is behind the ridge in the background

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# Capt. R. W. A. Brewer, Truck Inspector to His Majesty G. R.

**Inspecting Packard Trucks for British War Office**

1—Examining the magneto sealing
2—Watching for loose parts on the motor
3—Checking off the o. k.s
4—Trying out the motor control
5—Entering o.k.s on the official form
6—A last look 'round before driving away
7—Full speed ahead
8—Bumping the edge of the track to try out the springs, and steering
9—Testing the brakes first forwards and then backwards
10—All over, entering up the record

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# SALES

SALES of American-made motor trucks in this country have not fallen off despite the fact that 6,032 motor trucks, valued at $16,347,956, have been exported during March, April and May, according to the reports issued by the Department of Commerce, Washington, D. C. While several of the truck manufacturing companies in this country are at the present time working exclusively on war orders, the majority are paying a great deal of attention to the home market with the result that domestic sales are increasing instead of falling off.

The remarkable work which trucks have done so far in the war is, perhaps, one of the reasons for the increased sales in this country. Many of the smaller companies report greatly increased orders. This, no doubt, is due to a temporary lack of trucks by several of the larger concerns caused by filling some of the large initial war orders. Most of the companies now working on war orders have increased their production to take care of the home market as well as the foreign one.

Some of the important sales of many of the American truck manufacturers made during the 4 months from March to June, inclusive, are as follows:

The Adams Truck, Foundry & Machine Co., Findlay, O., maker of the Adams truck, recently sold a fleet of ten trucks to the National Refining Co.; two to the Krantz Brewing Co., and a fleet of six with automatic dump bodies to Hancock County, O.

Sales of Autocars, made by the Autocar Co., Ardmore, Pa., during the past 6 months are approximately 45 per cent greater than for the same period of the year previous. All of this increase was made in domestic business. A few of the most important sales are as follows:

| City | Type | No. | Capacity in Tons | Buyer | Business |
|---|---|---|---|---|---|
| Atlantic City, N. J. | Autocar | 1 | 2 | Shelborne Hotel | Hotel |
| Boston, Mass. | Autocar | 1 | 2 | Jenney Mfg. Co. | Oil Dealers |
| Boston, Mass. | Autocar | 1 | 2 | Cobb, Bates & Yerxa | Grocers |
| Brooklyn, N. Y. | Autocar | 1 | 2 | C. & E. Chapal Pruss & Co. | Partiers |
| Chicago | Autocar | 4 | 2 | The Ahrens & Ott Mfg. Co. | Plumbers' Supplies |
| Chicago | Autocar | 2 | 2 | Thomas Cusack Co. | Outdoor Advertisers |
| Jersey City, N. J. | Autocar | 1 | 2 | Novelty Candy Co. | Confectioners |
| Lansdowne, Md. | Autocar | 1 | 2 | Lansdowne & Baltimore Bus Co. | Bus Line |
| New York City | Autocar | 1 | 2 | Metropolitan Distributors, Inc. | Advertisers |
| New York City | Autocar | 4 | 2 | Cudahy Packing Co. | Meat Packers |
| New York City | Autocar | 1 | 2 | Adams Express Co. | Express |
| New York City | Autocar | 7 | 2 | General Baking Co. | Bakers |
| Philadelphia, Pa. | Autocar | 1 | 2 | E. Bradford Clarke Co. | Grocers |
| Philadelphia, Pa. | Autocar | 1 | 1 | Lit Bros. | Dept. Store |
| Philadelphia, Pa. | Autocar | 2 | 2 | Huyler's Ice Cream Co. | Ice Cream Dealers |
| Philadelphia, Pa. | Autocar | 2 | 2 | M. L. Shoemaker & Co., Ltd. | Fertilizer Dealers |
| Philadelphia, Pa. | Autocar | 2 | 2 | Weidfeld & Hess Brewing Co. | Brewers |
| Philadelphia, Pa. | Autocar | 1 | 2 | Kelly Bakery Co. | Bakers |
| Philadelphia, Pa. | Autocar | 2 | 2 | Owen Letter's Sons | Coal Dealers |
| Philadelphia, Pa. | Autocar | 3 | 2 | German Gazette Publishing Co. | Publishers |
| Philadelphia, Pa. | Autocar | 2 | 2 | Pure Oil Co. | Oil Dealers |
| Philadelphia, Pa. | Autocar | 2 | 2 | Horn & Hardart | Contractors |
| Philadelphia, Pa. | Autocar | 6 | 2 | McNeisel Paving & Construction Co. | Contractors |
| Providence, R. I. | Autocar | 1 | 2 | Bacopach Bros. | Caterers |

Sales of B. A. Gramm trucks, manufactured by the Gramm-Bernstein Co., Lima, O., have been on a steady increase and have necessitated an increase in production of fifty more trucks per month. The foreign sales of B. A. Gramm trucks, known abroad as the Garner, now amount to 125 per month for a period of 6 months. The vehicles sold abroad range in size from 2 to 6 tons. They are used for purely commercial purposes and not for war department work.

Some of the important recent sales of Barker trucks, made by C. L. Barker, Norwalk, Conn., are as follows:

| City | Type | No. | Capacity in Tons | Buyer | Business |
|---|---|---|---|---|---|
| Brewster, N. Y. | Barker | 1 | 1 | T. J. Fernandez | Butter |
| Cannon Station, Conn. | Barker | 1 | 1 | H. Warwick | Fruit Farmer |
| New York City | Barker | 1 | 2 | Standard Oil Co. of N. Y. | Oil Refiners |
| Norwalk, Conn. | Barker | 1 | 1 | Rosenfeld & Healy | Ice Dealers |
| Norwalk, Conn. | Barker | 1 | 2 | Rosenfeld & Healy | Ice Dealer |
| Rockville, Conn. | Barker | 1 | 1 | Edward White | Grain Dealer |
| South Norwalk, Conn. | Barker | 1 | 2 | Berman & Rotenberg | Produce Dealers |
| Waterbury, Conn. | Barker | 1 | 1 | United Electric Light & Water Co. | Public Service |
| Wilton, Conn. | Barker | 1 | 1 | Jackson & Webb | Fruit Grower |

Some of the important sales of Commerce trucks, manufactured by the Commerce Motor Car Co., Detroit, made since March are as follows:

| City | Type | No. | Capacity in Tons | Buyer | Business |
|---|---|---|---|---|---|
| Battle Creek, Mich. | Commerce | 1 | 3 | Post Estate | Food Products Mfr. |
| Beverly, Cal. | Commerce | 1 | ¾ | Pioneer Farm | Milk Dealers |
| Chicago | Commerce | 1 | ¾ | Kirchoff Bros. | Florists |
| Chicago | Commerce | 1 | ¾ | Lee Tire & Rubber Co. | Tire Dealers |
| Detroit | Commerce | 1 | ¾ | Walker Bros. | Caterers |
| Detroit | Commerce | 1 | ¾ | John Breitmeyer's Sons | Florists |
| Mobile, Ala. | Commerce | 1 | ¾ | Beiss Merchantile Co. | Dept. Store |
| New Haven, Conn. | Commerce | 1 | ¾ | Hamilton Rubber Co. | Rubber Goods Mfr. |
| Spokane, Wash. | Commerce | 1 | ¾ | Spokane Table Supply Co. | Grocers |
| Spokane, Wash. | Commerce | 1 | ¾ | Culbertson-Goode-Raskin Co. | Dept. Store |

Among the recent sales of Crawford trucks, manufactured by the Crawford Automobile Co., Hagerstown, Md., are the following: One 3-ton truck to the Crew Levick Co., oil dealers, and one 3-tomer to J. W. Myers & Co., wholesale grocers, both of Hagerstown; and one 3-ton vehicle to the South Cumberland Plaining Mill Co., Cumberland, Md.

A few of the most prominent sales of C. T. electric trucks, manufactured by the Commercial Truck Co. of America, Philadelphia, Pa., made between March and June are as follows:

| City | Type | No. | Capacity in Tons | Buyer | Business |
|---|---|---|---|---|---|
| Atlantic City, N. J. | C. T. | 4 | ... | Hotel Traymore | Bus Line |
| Atlantic City, N. J. | C. T. | 1 | ... | Hotel Brighton | Bus Line |
| Brooklyn, N. Y. | C. T. | 4 | 1½ | Obermeyer & Liebmann Brewing Co. | Brewers |
| Corpus Christi, Tex. | C. T. | 1 | 2 | Corpus Christi Ice Co. | Ice Dealer |
| New York City | C. T. | 4 | 2 | Federal Light Co. | Public Service |
| New York City | C. T. | 2 | 2 | Horn & Hardart Co. | Lunchroom Proprietors |
| Philadelphia, Pa. | C. T. | 4 | ½ | Strawbridge & Clothier | Dept. Store |
| Philadelphia, Pa. | C. T. | 4 | 1 | Union Transfer Co. | Baggage Transfer |
| Philadelphia, Pa. | C. T. | 1 | 2 | A. Schoenfeld Co. | Toy Makers |
| Philadelphia, Pa. | C. T. | 1 | 1 | Harrison Bros. & Co. | Paint Makers |
| Providence, R. I. | C. T. | 1 | 3½ | Outlet Store | Dept. Store |

The most important sale of Denby trucks made during the past 4 months was that of thirty 1-ton vehicles to the Monahan Express Co., New York City. These trucks were put into service on July 1 in the collection and delivery of parcel post packages in the boroughs of Manhattan and the Bronx. An illustration of the entire fleet was published in the July 15 issue of THE COMMERCIAL VEHICLE.

The majority of the sales of Diamond-T trucks were made in Chicago, the home of the Diamond-T Motor Car Co., the manufacturer. A few of the sales made from March to June, inclusive, are as follows:

| City | Type | No. | Capacity in Tons | Buyer | Business |
|---|---|---|---|---|---|
| Chicago | Diamond-T | 1 | 3 | Sprague, Warner & Co. | Grocers |
| Chicago | Diamond-T | 1 | 2 | The Heinz Co. | Brewers |
| Chicago | Diamond-T | 1 | 1½ | American Printing Service | Outdoor Advertisers |
| Chicago | Diamond-T | 1 | 2 | Weil Bros. | Plumbing Supply Dlrs. |
| Chicago | Diamond-T | 1 | 2 | Swedish Produce Co. | Fish Dealers |
| Chicago | Diamond-T | 3 | ¾ | Boston Store | Dept. Store |
| Chicago | Diamond-T | 5 | 1½ | Boston Store | Dept. Store |
| Chicago | Diamond-T | 1 | 2 | Johnson Chair Co. | Chair Mfr. |
| Chicago | Diamond-T | 1 | 2 | Crawford Co. | Pipe Dealer |
| Chicago | Diamond-T | 1 | 2 | Garden City Sand Co. | Bldg. Mat'l. Dealer |
| Chicago | Diamond-T | 1 | 2 | J. & Cordell | Grocer |
| Chicago | Diamond-T | 1 | 2 | John Keefe | Caterer |
| Chicago | Diamond-T | 1 | 4 | Younger & Devine Dairy Co. | Milk Dealers |
| Chicago | Diamond-T | 1 | 2 | Thompson & Taylor Spice Co. | Spice Dealers |
| Chicago | Diamond-T | 1 | 1½ | Royal Furniture Co. | Furniture Store |
| Chicago | Diamond-T | 1 | 1½ | West Chicago Park Commission | Municipal |
| Chicago | Diamond-T | 1 | 1½ | Charles Barnes | Live Stock Dealer |
| Chicago | Diamond-T | 1 | 2 | F. B. Cleary | Florist |
| Chicago | Diamond-T | 1 | 3 | Libby, McNeill & Libby | Meat products |
| Chicago | Diamond-T | 1 | 2 | James Vanthoupelen | Grocer |
| Chicago | Diamond-T | 1 | 1½ | Advance Roofing & Sheet Metal Wks. | Roofer |
| Chicago | Diamond-T | 1 | 1½ | Fairbanks-Morse | Grocers |
| Chicago | Diamond-T | 1 | 2 | Hoelscher Bros. | Plumbing Supply Dlrs |
| Chicago | Diamond-T | 1 | 3 | Jennings Passage Wks. | Passage Mfr. |
| Chicago | Diamond-T | 1 | 2 | Herbold Clark Co. | Chair Mfr. |
| Chicago | Diamond-T | 1 | 2 | Ansorge Co. | Car Mfr. |
| Chicago | Diamond-T | 1 | 2 | Louis Sievers' Sons Co. | Liquor Dealers |
| Chicago | Diamond-T | 1 | 1½ | Bird Bros. | Produce Dealers |
| Chicago | Diamond-T | 1 | 1½ | William J. Quigley & Co. | Florist Decorator |
| Chicago | Diamond-T | 1 | 1 | G. W. Lires & Son | Butter Dealer |
| Chicago | Diamond-T | 1 | 4 | Chicago Lt. & Power Co. | Grocers |
| Chicago | Diamond-T | 1 | 3 | Thorolf Kalmbrodt | Bldg. Mat'l. Dealer |
| Buffalo, N. Y. | Diamond-T | 1 | 2 | Peter Cross | |
| Elgin, Ill. | Diamond-T | 1 | 2 | S. R. Moore | Oil Dealer |
| Elgin, Ill. | Diamond-T | 1 | 1½ | Hinchelmer Bros. Mfg. Co. | Mill Works |
| Evanston, Ill. | Diamond-T | 1 | 3 | Crowley & Hall | Expressmen |
| Santa Fe, Isle of Pines, W. I. | Diamond-T | 1 | 2 | Wilbert Clark | Expressman |
| Tonawanda, N. Y. | Diamond-T | 1 | 3 | Tonawanda Brewing Co. | Brewers |
| Wichita, Kan. | Diamond-T | 1 | 2 | Wichita Wholesale Grocery Co. | Grocers |

The Duplex-Power Car Co., Charlotte, Mich., manufacturer of Duplex four-wheel-driven trucks, has sold several vehicles during the past 4 months in various states for hauling mili-

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tary supplies, fruit, manufactured products and general merchandise. One of the 2-ton units sold in Charlotte recently hauled a flock of 300 sheep from a farm 6 miles outside the city limits. The sheep were carried on the truck and on a train of six trailers. The total weight of the sheep was 13 tons and the weight of the trailers 4½ tons, a total hauled of almost 20 tons.

Some of the important sales of Federal trucks recently made by the Federal Motor Truck Co., Detroit, are as follows:

| City | Type | No. | Capacity in Tons | Buyer | Business |
|---|---|---|---|---|---|
| Albany, N. Y. | Federal | 1 | 1½ | Troy Auto Car Co. | Bus Line |
| Chattanooga, Tenn. | Federal | 1 | 2½ | Southern Express Co. | Express |
| Dearborn, Mich. | Federal | 1 | 1½ | James Cousins | Farmer |
| Detroit | Federal | 1 | 1½ | Hudson Motor Car Co. | Passenger Car Mfr. |
| Detroit | Federal | 1 | 1½ | Continental Motor Mfg. Co. | Motor Mfr |
| Detroit | Federal | 3 | 2½ | Crowley-Milner Co. | Dept. Store |
| Detroit | Federal | 1 | 1½ | Detroit Taxi Cab Co. | Taxicabs |
| Milwaukee, Wis. | Federal | 1 | 1½ | Pabst Brewing Co. | Brewery |
| New York City | Federal | 15 | 1½ | Wells Fargo & Co. | Express |
| Ottumwa, Ia. | Federal | 3 | 1½ | Louis Morstatt & Co. | Fuel Packers |
| Philadelphia, Pa. | Federal | 1 | 2½ | Atlantic Refining Co. | Oil Refiners |
| Richmond Hill, L. I. | Federal | 3 | 1½ | Dittmann Baking Co. | Bakers |
| San Francisco, Cal. | Federal | 2 | 2½ | Associated Oil Co. | Oil Dealers |
| St. Louis, Mo. | Federal | 1 | 2½ | Armour & Co. | Meat Packers |
| St. Louis, Mo. | Federal | 1 | 2½ | Swift & Co. | Meat Packers |
| St. Louis, Mo. | Federal | 1 | 2½ | Morris & Co. | Meat Packers |
| St. Louis, Mo. | Federal | 1 | 2½ | Cudahy Packing Co. | Meat Packers |
| St. Louis, Mo. | Federal | 1 | 2½ | Fleischmann Yeast Co. | Yeast Mfrs. |

The Gabriel Auto Co., Cleveland, O., recently sold four 1½-ton trucks with tank bodies to the Canfield Oil Co., Cleveland, O., and five 1-tonners to the Green Line, a bus concern in Cleveland. The sale of Gabriel trucks in other lines of business has also been better than in 1914.

Sales of Indiana trucks, manufactured by the Harwood-Barley Mfg. Co., Marion, Ind., for the past few months are practically double what they were in the same period of last year. Most of the orders have been for one truck at a time. The Harwood-Barley company is now turning out two special trucks for the City of Newark, O. J. L. Partlow, Indianapolis, recently purchased two Indianas, making twelve now owned by him.

Among the important sales of trucks manufactured by the International Motor Co., New York City, during March, April and May, those of the new worm-driven Macks have been very conspicuous. During this period approximately 30 per cent of the orders for Mack and Saurer trucks have been for the 1- and 2-ton worm-driven Macks.

Some of the important sales in March are as follows:

| City | Type | No. | Capacity in Tons | Buyer | Business |
|---|---|---|---|---|---|
| Bayonne, N. J. | Saurer | 1 | 2 | James E. Lynch | Transfer |
| Brooklyn, N. Y. | Mack | 2 | 5 | Erhart Bros. | Furniture Moving |
| Cambridge, Mass. | Mack | 1 | 2 | Globe Express Co. | Express |
| Chelsea, Mass. | Mack | 1 | 5 | Coleman Bros. | Contractor |
| Chicago, Ill. | Mack | 2 | 2 | Rothschild & Co. | Dept. Store |
| Floral Park, N. Y. | Mack | 2 | 2½ | H. Aspellmi | Farmer |
| Hastings, N. Y. | Saurer | 1 | 3 | Charles H. Scott | Transfer |
| New Brunswick, N. J. | Saurer | 1 | 2 | Samuel Fuller | General Trucking |
| New Haven, Conn. | Mack | 1 | 1½ | Southern New England Telephone Co. | Telephone |
| New York City | Mack | 1 | 2 | Standard Oil Co. | Oil |
| New York City | Mack | 1 | 2 | E. H. Merrill Spring Co. | Spring Mfr. |
| New York City | Mack | 2 | 2½ | Jacob Fuchs | Contractor |
| New York City | Mack | 1 | 2½ | R. Carvel Co., Inc. | Contractor |
| Philadelphia, Pa. | Mack | 1 | 2 | Perlmeter Packing Co. | Fakers |
| Philadelphia, Pa. | Mack | 2 | 2 | Peter Hertig | Milk Dealer |

All of the above were repeat orders. In addition, approximately fifty trucks were sold, mostly in orders of one and two, in various parts of the country.

The April sales exceeded those of the previous month. Some of the most important of these are:

| City | Type | No. | Capacity in Tons | Buyer | Business |
|---|---|---|---|---|---|
| Astoria, L. I. | Saurer | 1 | 3 | Astoria Auto Truck Corp. | Truckman |
| Astoria, L. I. | Saurer | 1 | 2½ | H. Falconer Contracting Co. | Contractors |
| Baltimore, Md. | Saurer | 1 | 6 | J. W. Bitter & Co. | Contractor |
| Baltimore, Md. | Saurer | 1 | 3 | George Lumber Bog Co. | Brewer |
| Baltimore, Md. | Mack | 1 | 1 | Gaither & Bro. | Hardware |
| Baltimore, Md. | Mack | 1 | 2 | City Baking Co. | Baker |
| Bernardsville, N. J. | Mack | 1 | 1½ | Walter Hine | Farmer |
| Bloomingdale, N. J. | Mack | 1 | 1½ | J. H. Onderdonk | Truckman |
| Boston, Mass. | Mack | 1 | 1 | Albert Burkhardt | Expressman |
| Boston, Mass. | Mack | 1 | 2 | Brookline-Smith Corp. | ..... |
| Brooklyn, N. Y. | Mack | 1 | 1 | Morse Dry Dock & Repair Co. | Boat Bldrs. |
| Brooklyn, N. Y. | Mack | 1 | 2½ | J. J. McLaughlin | Contractor |
| Brooklyn, N. Y. | Mack | 1 | 5 | J. J. McLaughlin | Contractor |
| Bethlehem, Pa. | Mack | 1 | 1 | W. M. Applegate | Tobacco Mfr. |
| Buffalo, N. Y. | Saurer | 1 | 6½ | Squaw Island Development | Land Dealer |
| Chicago | Saurer | 1 | 2 | Tom Nichols | Produce Dealer |
| Chicago | Saurer | 1 | 2 | George Demetral | Truckman |
| Chicago | Saurer | 1 | 5 | M. C. Ferro | Oil Dealer |
| Danville, Pa. | Mack | 1 | 2 | J. H. Greene & Co. | Grocer |
| Dayton, O. | Saurer | 1 | 5 | City of Dayton | Municipal |
| Erie, Pa. | Mack | 1 | 3 | E. H. Scott & Co. | ..... |
| Garfield, N. J. | Saurer | 1 | 5 | Garfield Worsted Mills | Textile Mfr. |
| Greenwich, Conn. | Saurer | 1 | 3 | William Doran | Truckman |
| Hartford, Conn. | Saurer | 1 | 5 | Hartford Sand & Stone | Bldg. Matl. Contr. |
| Hoboken, N. J. | Mack | 1 | 3 | R. H. Davis Co. | Baking Pwdr. Mfr. |
| Jersey City, N. J. | Mack | 6 | 7½ | American Sugar Refining Co. | Sugar Mfr. |
| Lakeland, Md. | Mack | 1 | 2 | W. E. Brohawn | Truckman |
| Manassas, W. Va. | Mack | 1 | 5 | Fitch-Allen Contracting Co. | Contractor |
| Mt. Arlington, N. J. | Mack | 1 | 2 | R. J. Chaplin & Sons | Truckmen |
| New Brunswick, N. J. | Saurer | 1 | 5 | Samuel Fuller | Truckman |
| Neponsit, Mass. | Mack | 1 | 2 | G. L. Lawley & Sons Co. | Boat Builders |
| Newark, N. J. | Mack | 1 | 1 | Newark News Dealers Supply Co. | News Dealers |
| Newark, N. J. | Saurer | 1 | 6½ | Lion & Son Brewing Co. | Brewers |
| New York City | Saurer | 1 | 6½ | Handy Bros. | Contractors |
| New York City | Mack | 1 | 1½ | Jacob Fuchs | Contractor |
| New York City | Mack | 1 | 5 | Leon Pierre | Truckman |
| New York City | Mack | 2 | 6 | Harlem Market Warehouse Co. | Transfer |
| New York City | Mack | 1 | 2 | J. J. Lynchy | Truckman |
| New York City | Mack | 1 | 2 | John Bertels | Produce Dealer |
| New York City | Mack | 1 | 1 | Third Avenue Railway Co. | Railway |
| New York City | Mack | 1 | 5 | W. H. Callahan Contracting Co. | Contractors |
| New York City | Mack | 1 | 1 | United Gas & Elec. Eng. Co. | Gas and Electricity |
| New York City | Saurer | 2 | 6½ | George H. Pride | Truckman |
| Newark, N. J. | Mack | 1 | 2 | Standard Oil Co. | Oil Dealers |
| Oak View, Pa. | Mack | 1 | 5 | L. Gillespie & Son | Contractors |
| Philadelphia, Pa. | Saurer | 1 | 6½ | Wa Wa Dairy Co. | Milk Dealer |
| Portland, Ore. | Saurer | 1 | 5 | Standard Oil Co. | Oil Dealers |
| Pottsville, Pa. | Mack | 1 | 2 | George L. Yeagle | Truckman |
| Reading, Pa. | Mack | 1 | 2 | John Gel | Truckman |
| Seattle, Wash. | Mack | 3 | 2 | Pacific Northwestern Traction Co. | Railway |
| Seattle, Wash. | Mack | 2 | 5 | King City County Commn. | Municipal |
| Swanton, Pa. | Mack | 1 | 2 | Armour & Co. | Meat Packers |
| Stamford, Conn. | Saurer | 1 | 2 | Stamford Mason Supply Co. | Bldg. Matl. Dealers |
| Tonson, Md. | Mack | 1 | 2 | Harry T. Campbell | Contractor |
| Wayertown, Mass. | Mack | 1 | 3 | Horatio Butters | Expressman |
| Washington, D. C. | Mack | 1 | 2 | Columbia Sightseeing Co. | Bus Line |
| West Hartford, Conn. | Saurer | 1 | 5 | A. C. Steinberg | Contractor |
| Williamsport, Pa. | Mack | 1 | 1½ | Rothfuss Garage Co. | Garageman |
| Wilkes-Barre, Pa. | Mack | 1 | 2 | Armour & Co. | Meat Packers |
| Wilmington, Del. | Mack | 1 | 2 | Wilmington Sash & Door Co. | Sash Mfr. |

Some recent domestic sales of motor trucks. On the top row, from left to right, a Gabriel 1½-tonner, one of a fleet of four sold to the Canfield Oil Co., Cleveland, O.; a 1½-ton Federal sold to the Fleischman Yeast Co., St. Louis, Mo., and a Mack 2-ton worm-driven truck sold to the H. J. Heinz Co., Pittsburgh, Pa. On the bottom row, from left to right, a Stewart ¾-tonner sold to the Sanatorio-La Esperanza, a bus line, in Havana, Cuba; a 2-ton Autocar sold to the Cudahy Packing Co., New York City, and a 3½-ton C. T. electric sold to the Outlet Co., a department store in Providence, R. I.

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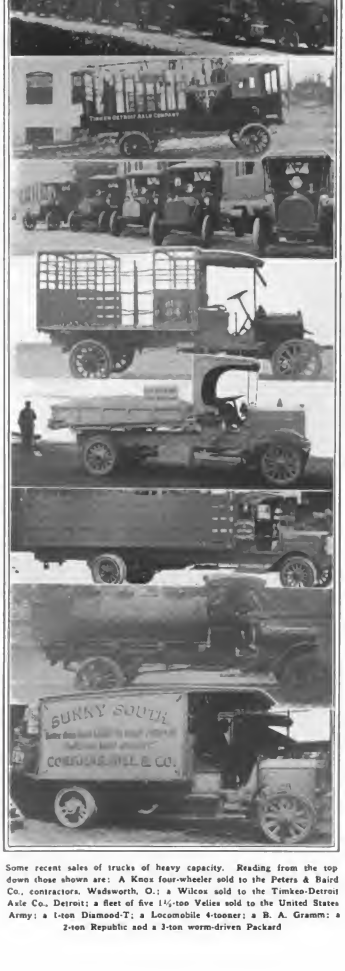


Some recent sales of trucks of heavy capacity. Reading from the top down those shown are: A Knox four-wheeler sold to the Peters & Baird Co., contractors, Wadsworth, O.; a Wilcox sold to the Timkeo-Detroit Axle Co., Detroit; a fleet of five 1½-ton Velies sold to the United States Army; a 1-ton Diamond-T; a Locomobile 4-tooner; a B. A. Gramm; a 2-ton Republic and a 3-ton worm-driven Packard

Some of the most prominent of the sales of Mack and Saurer trucks made during May are as follows:

| City | Type | No. | Capacity in Tons | Buyer | Business |
|---|---|---|---|---|---|
| Allentown, Pa. | Mack | 1 | 3 | City of Allentown | Municipal |
| Baltimore, Md. | Mack | 1 | 1 | Maryland Dairy Co. | Milk Dealers |
| Baltimore, Md. | Mack | 1 | 1 | E. Eating Co. | Contractors |
| Baltimore, Md. | Mack | 1 | 2 | George Gunther Brewing Co. | Brewers |
| Baltimore, Md. | Saurer | 1 | 6½ | G. B. F. Brewing Co. | Brewers |
| Bethlehem, Pa. | Mack | 1 | 2 | Brown-Borhek Lumber Co. | Lumber Dealers |
| Boston, Mass. | Mack | 1 | 2 | H. Schwartz & Co. | Bottlers |
| Bridgeport, Conn. | Mack | 1 | 1½ | Frank E. Fair | Milk Dealer |
| Camden, N. J. | Mack | 2 | 5 | City Lime, Brick & Lumber Co. | Bldg Matl Dealer |
| Chadwicks, N. Y. | Mack | 1 | 4 | Utica Willowdale Brewery Co. | Brewers |
| Coeur'es Bridge, Del. | Mack | 1 | 2 | J. T. Dupree | Flour Dealer |
| El Paso, Tex. | Mack | 1 | 2 | Koerp-Kirkpatrick Co. | Lumber Dealer |
| Floral Park, L. I. | Mack | 2 | 7½ | H. Ampolini | Farmer |
| Harrington, Kan. | Mack | 1 | 2 | Harry Griffin | Oil Dealer |
| Ipswich, Mass. | Mack | 1 | 4 | George H. Brown | Hay and Grain Dealer |
| Kansas City, Mo. | Mack | 1 | 5 | City Ice & Storage Co. | Ice Dealer |
| Kansas City, Mo. | Mack | 1 | 1 | L. Lettle Moving Co. | Furniture Mover |
| Kansas City, Mo. | Mack | 1 | 2 | Household Fair Co. | Dept. Store |
| Meriden, Conn. | Saurer | 1 | 5 | R. Harold Co. | Contractor |
| Mt. Carmel, Pa. | Mack | 1 | 1 | Vallish Bros. | Bus Line |
| Newark, N. J. | Mack | 1 | 2 | Brosnjak & Pernilich | Produce Dealers |
| Newark, N. J. | Mack | 1 | 2 | Standard Tallow Co. | Meat Products Dealer |
| New Rochelle, N. Y. | Mack | 2 | 4 | Louis Rosenguarten | Produce Dealer |
| New York City | Mack | 1 | 2 | Robin Dry Dock & Repair Co. | Boat Builder |
| New York City | Mack | 1 | 5 | Albert Krumenaker | Brewer |
| New York City | Saurer | 1 | 5 | Pure Oil Co. | Oil Dealer |
| New York City | Mack | 1 | 2 | Auto Trucking Co. | Truckmen |
| New York City | Mack | 1 | 1½ | Auto Trucking Co. | Truckmen |
| New York City | Mack | 1 | 5 | E. C. Ludin | Truckman |
| Norfolk, Va. | Mack | 1 | 1½ | Norfolk Delivery Corp. | Transformers |
| Pendleton, Ore. | Mack | 1 | 1 | Pendleton Auto Co. | Bus Line |
| Philadelphia, Pa. | Mack | 1 | 2 | Pfeffer Baking Co. | Baker |
| Pittsburgh, Pa. | Mack | 1 | 2 | H. J. Heinz Co. | Food Products Mfr |
| Reading, Pa. | Mack | 1 | 2 | John Ort | Bus Line |
| Roselle Park, N. J. | Mack | 1 | 3 | Borough of Roselle Park | Municipal |
| Schuylkill Haven, Pa. | Mack | 1 | 1 | W. L. Moyer | Bus Line |
| Topeka, Kan. | Mack | 1 | 2 | E. Horn & Co. | Lumber Dealer |
| Turtle Creek, Pa. | Mack | 1 | 3 | Zarcone Fruit Co. | Fruit Dealer |
| Waterbury, Conn. | Saurer | 1 | 5 | Waterbury Sand & Gravel Co. | Contractor |
| Wilkesbarre, Pa. | Mack | 2 | 3 | Stegmaier Brewery Co. | Brewer |

The International Motor Co. has recently closed a contract with the Milnes-Daimler Co., London, England, for a large number of Mack 2-ton worm-driven trucks to be delivered over a 2-year period and to be used for purely commercial purposes.

The most important sale of Mack and Saurer trucks during June was that to R. H. Macy & Co., New York City. That concern, one of the prominent Gotham department stores, purchased ten 1-ton and two 1½-ton Mack worm-driven trucks. The remainder of the orders placed during the month were for one, two or three vehicles.

The most important sale of I. H. C. trucks made recently by the International Harvester Co. of America, Inc., Chicago, was that of twelve 1,500-pound and two 2,000-pound trucks to the Cincinnati & Suburban Bell Telephone Co., Cincinnati, O.

Domestic sales of Kelly trucks, made by the Kelly-Springfield Motor Truck Co., Springfield, O., during the months of April and June were larger than in any other months in the history of the company. Some of the recent orders for more than one vehicle are as follows:

| City | Type | No. | Capacity in Tons | Buyer | Business |
|---|---|---|---|---|---|
| Birmingham, Ala. | Kelly | 2 | 1½ | Webb Cotton Co. | Cotton Goods Mfrs |
| Pittsburgh, Pa. | Kelly | 2 | 3½ | New Century Flour Co. | Flour Mfrs |
| Memphis, Tenn. | Kelly | 2 | 1½ | Memphis Coca Cola Bottling Co. | Bottlers |
| Minneapolis, Minn. | Kelly | 4 | 1 | National Pure Water Co. | Water Dealers |
| Springfield, O. | Kelly | 2 | 2 | City of Springfield | Municipal |
| San Francisco, Cal. | Kelly | 2 | 5 | Shell Gasoline Co. | Gasoline Dealers |
| San Francisco, Cal. | Kelly | 3 | 1½ | Shell Gasoline Co. | Gasoline Dealers |

In addition, many one-at-a-time sales were made in various cities throughout the United States for trucks of from 1 to 5 tons capacity.

Among the many domestic sales of Kisselkar trucks, manufactured by the Kissel Motor Car Co., Hartford, Wis., are five 1,500-pound vehicles bought by the Panama-Pacific Exposition. Four of the trucks are used in the commissary department and the fifth in the financial department.

Many of the recent sales of Koehler 1-ton trucks, manufactured by the H. J. Koehler S. G. Co., Newark, N. J.,

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have been for jitney bus service. A few of these are as follows:

| City | Type | No. | Capacity in Tons | Buyer | Business |
|---|---|---|---|---|---|
| Lakeland, Fla. | Koehler | 1 | 1 | McKay Co. | Bus Line |
| New Haven, Conn. | Koehler | 1 | 1 | H. Goldman & S. H. Flaxman | Bus Line |
| Pensacola, Fla. | Koehler | 3 | 1 | Pensacola Bus Co. | Bus Line |
| Providence, R. I. | Koehler | 1 | 1 | K. L. C. Baldwin | Bus Line |
| Reading, Pa. | Koehler | 1 | 1 | Julian A. Stein | Bus Line |
| Utica, N. Y. | Koehler | 1 | 1 | A. V. Kirkland | Bus Line |

Among the recent sales of the Knox four-wheeled tractors, sold by the Knox Motors Associates, Springfield, Mass., are the following: One to Bichler Bros., Gladstone, Mich.; one to the Illinois Brick Teaming Co., Chicago, and one to the Peters & Baird Co., Wadsworth, O.

The Chicago Pneumatic Tool Co., Chicago, Ill., manufacturer of the Little Giant motor truck, has sold several trucks during the past few months in various states for hauling general merchandise, jitney bus service, etc. The company has just brought out a six-wheeled truck made up of a standard 1-ton vehicle and a two-wheeled semi-trailer similar to that described in the April 1, 1915, issue of THE COMMERCIAL VEHICLE.

The Locomobile Co. of America, Bridgeport, Conn., has recently sold several of its 4-ton worm-driven vehicles to the following concerns: One to the Frank Miller Lumber Co.; three to the State of Connecticut, Highways Dept.; one to John H. Earley, brick manufacturer; one to the Remington Arms & Ammunition Co., firearms manufacturer; one to the Eighth Street Sand & Gravel Co., contractors, and one to the William H. Wood Lumber Co. All of these concerns are located in Bridgeport.

Practically all of the sales of Morton trucks, made by the Morton Truck & Tractor Co., Harrisburg, Pa., since March have been war orders.

The Packard Motor Car Co., Detroit, although having sold a large number of its trucks abroad, is progressing rapidly in the sales of its new worm-driven models in this country.

The Republic Motor Truck Co., Alma, Mich., recently sold a 2-ton Republic equipped with an oil tank to G. M. Benish, Great Western Oil Refining Co., Kansas City, Mo., and another of the same size and type to the Red Seal Oil Co., Chicago.

Stewart 1,500-pound light delivery trucks, manufactured by the Stewart Motor Corp., Buffalo, N. Y., have recently been sold to the following concerns:

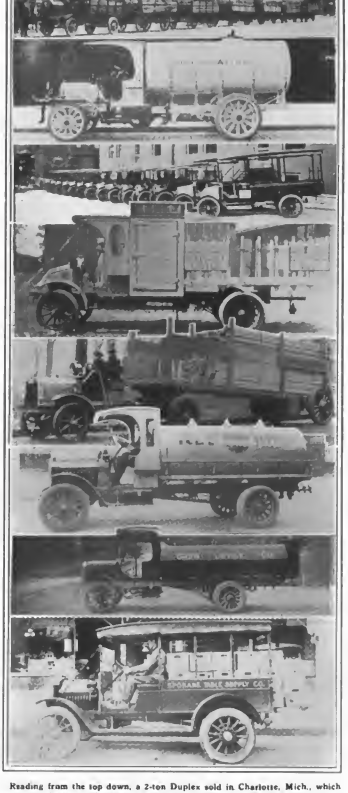
| City | Type | No. | Capacity in Tons | Buyer | Business |
|---|---|---|---|---|---|
| Albany, N. Y. | Stewart | 2 | ½ | Albany, Delmar & Slingerlands Bus Line | Bus Line |
| Atlanta, Ga. | Stewart | 4 | ½ | Coca-Cola Co. | Bottlers |
| Buffalo, N. Y. | Stewart | 2 | ½ | Buffalo Police Dept. | Patrol Vehicles |
| Buffalo, N. Y. | Stewart | 1 | ½ | Buffalo Police Commission | Animal Ambulance |
| Buffalo, N. Y. | Stewart | 3 | ½ | Wallerstein & Co. | Hardware Depts. |
| Havana, Cuba | Stewart | 1 | ½ | Mercedes Hospital | Ambulance |
| Havana, Cuba | Stewart | 1 | ½ | Sanatorio La Esperanza | Bus Line |
| Matanzas, Cuba | Stewart | 1 | ½ | Hospital, Las Animas | Ambulance |
| New York City | Stewart | 1 | ½ | Bowen-Teller & Co. | Milliners |
| New York City | Stewart | 1 | ½ | New York Telephone Co. | Telephone |
| Plainfield, N. J. | Stewart | 1 | ½ | Muhlenberg Hospital | Ambulance |
| Rochester, N. Y. | Stewart | 3 | ½ | Sibley, Lindsay & Curr | Dept. Store |

The most important sale made by the Velie Motor Vehicle Co., Moline, Ill., during the past 4 months is that to the executive departments of the United States Government. The contract for these vehicles, awarded through the general supply committee, calls for four 3,000-pound trucks, five 2-tonners and four 3-ton trucks. Five 1½-ton Velies have also been delivered recently to the United States Army for use on the Mexican border.

During March and April the Wichita Falls Motor Co., Wichita Falls, Tex., sold three 4-ton Wichita trucks to the Street Dept. of the City of New Orleans, La., and three 3½-ton trucks to Hansen & Sons, Galveston, Tex., contractors. Orders were also secured for fifty-five trucks for commercial purposes in England.

Most of the recent sales of Willys-Overland 1,500-pound delivery cars have been in orders of one each, although Lord Gage & Co., Reading, Pa., bought three and the Carl Sulzer Baking Co., Chicago, purchased three during March and April.

The White Co., Cleveland, O., while having sold a large number of its trucks to the belligerent nations abroad, has also sold many in the home market to concerns engaged in practically all kinds of business.




Reading from the top down, a 2-ton Duplex sold in Charlotte, Mich., which recently hauled a flock of 300 sheep by the use of six trailers; a 3-ton Saurer sold to the City of Dayton, O., for municipal work; a fleet of twelve I. H. C. 1,500-pounders and two 2,000-pounders sold to the Cincinnati & Suburban Bell Telephone Co., Cincinnati, O.; a Kelly 2-tonner sold to the Gayoso Farm, Memphis, Tenn., and equipped with a special refrigerator; a large White tractor and trailer sold to the Traxler Lumber Co., New York City; a 2-ton Republic tank truck sold to the Red Seal Oil Co., oil distributers in Chicago; a 3-ton Crawford sold to the Crew Levick Co., oil refiners, for use in Hagerstown, Md., and a ¾-ton Commerce truck sold to the Spokane Table Supply Co., Spokane, Wash. The trucks shown above, while a very small percentage of those sold during the 4-month period from March to June, inclusive, nevertheless indicate the great variety of work in which the vehicles purchased recently are being used

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## Watson Front-driven Truck

BOTTOM-DUMP wagons have long been preferred for the haulage of contractors' material, and the Watson Wagon Co., Canastota, N. Y., has been specializing in this type of equipment for 26 years. Recently it has constructed a number of trailers for motor tractors on the same principle as the Watson wagon. The latest product of the concern is a bottom-dumping motor truck of 5 tons capacity, comprising a Watson wagon connected with a two-wheeled Walter front-driven tractor, the whole comprising a rigid four-wheeled unit.

The Watson truck is made in only one size and type, rated at 5 tons—which is conservative—and priced at $4,000. The power unit consists of a unit power plant and jackshaft under a French type hood and a cab, mounted on a steel frame which is about balanced over the front springs. The front wheels drive and steer, the final drive being inclosed spur gears.

The body unit consists of a specially-built steel-framed Watson bottom-dumping wagon, with high wood wheels in the rear, fitted with steel tires and external motor car brakes. It is secured to the power unit by a heavy steel brace and may be removed for the substitution of another type of wagon.

The wheelbase is 158 inches. Front tires are 40 by 5 duals and the rear wheels are 53 by 5. The load distribution is one-third on the front wheels and two-thirds on the rear wheels. This means a saving in rubber tires; it means that the weight on the front wheels is nearly constant whether loaded or light, which in turn means that the mechanism is protected from shock and vibration at all times.

The motor is a four-cylinder block-cast type with cylinders 4⅛ by 6, giving 30.65 S. A. E. horsepower. The valves are located on the right side and their mechanisms are inclosed. Cooling is effected by centrifugal pump circulation through a finned-tube radiator mounted on the dash. Eisemann dual ignition with automatic spark advance is employed and a Zenith carbureter is used.

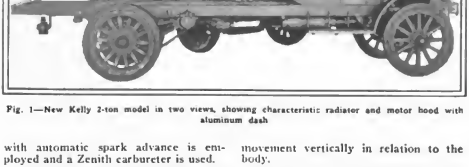

Fig. 1—New Kelly 2-ton model in two views, showing characteristic radiator and motor hood with aluminum dash

From the motor the drive is taken by a cone clutch to the four-speed selective gearset incorporated with the jackshaft. The jackshaft is directly above the front axle, driving through two universals on each side to spur pinions on the stub-axles. These pinions mesh with gears on the wheels, within which are internal brakes.

Steering knuckles are inclosed by the brakes and act as on the conventional front axle. The outside universals on the jackshafts are located directly above the steering king-bolts, and transmit the drive through an angle of 33 degrees when the wheels are turned.

Back of the front axle there is no driving mechanism, the dash being practically directly above the axle. Left steer and center control are employed, the foot brake acting simultaneously on all four wheels and the hand brake on the rear wheels only.

The rear axle is mounted on a pair of short coil springs much like those used on street car trucks. These serve to absorb the vibration of the axle and to allow the rear axle a limited amount of movement vertically in relation to the body.

The body is of the flareboard type, the bottom being in two sections hinged on the sides and overlapping in the middle. A transverse shaft beneath the front end acts as a winch to wind up a pair of longitudinal chains which run beneath the bottom doors to raise them and keep them closed. The rear ends of these chains are held in grab sockets which permit of their adjustment for any opening of the doors.

The winding shaft is operated by a lever on the right side of the cab, the two chains being wound on separate drums, operated by individual ratchets. A simple pivoting arrangement on the lever permits one of these ratchets to be operated at a time, so that one door always closes first, insuring a lap joint when the doors are closed.

The load is dumped by pressing a pedal on the right side of the cab. By means of the chain adjustment at the rear it is possible to regulate the doors so as to dump the entire load in one pile or to spread it over any practicable distance.

The vehicle may be operated at 12 miles per hour, the rear wheels being on Timken bearings. The distribution of total weight when loaded being about equal, and the driving and braking being on the front wheels, the danger of skidding is practically eliminated. The vehicle will turn in a 48-foot circle.

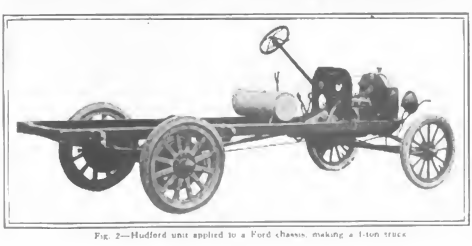

Fig. 2—Hudford unit applied to a Ford chassis, making a 1-ton truck

## Hudford—1-ton Ford

FORDS are rated at 800 pounds carrying capacity, and when not overloaded make satisfactory delivery vehicles; but there is a demand for a truck of greater capacity with the Ford features of simplicity and low price. Accordingly, the Hudford Co., Philadelphia, Pa., is producing the Hudford attachment by which the rear or load-carrying portion of a Ford may be strengthened for a pay load of 2,000 pounds.

This unit comprises a pressed steel auxiliary frame, mounted on a pair of

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Fig. 3—Watson bottom-dumping front-driven 5-tonner, showing grouping of all power units over front axle and wagon body

semi-elliptic springs, a Russel internal-gear-driven axle, and 32-inch wheels with 3-inch solid tires. A regular Ford chassis, which can be purchased for $410, comprises the rest of the vehicle.

By removing the rear axle and spring of the Ford, putting the rear wheels on the front axle and riveting the Hudford frame to the Ford, the two sections are united. A double-universaled tubular shaft is substituted for the Ford shaft and connected with the Russel axle and the result is a 1-ton truck with a 120-inch wheelbase, a 6 to 1 or 7 to 1 gear-reduction and a load space so balanced that 90 per cent of the load is on the rear wheels. This leaves about the same load on the front wheels as with the touring body and disturbs nothing on the Ford from the driver's seat forward. The same brake rods are connected with the Russel brakes.

The Hudford unit costs $325. Adding this to the $410 Ford chassis, if bought new, the total price is $735. But the rear axle, rear spring, front wheels and tires and Ford driving shaft may be sold to a Ford dealer or repairman for $100, the Hudford people claim, leaving a net cost of $535 for the 1-ton truck.

## Republic Shaft-driven 2-tonner

LARGER than the other three models, the latest Republic truck, made by the Republic Motor Truck Co., Alma, Mich., is of 2 tons capacity and internal-gear driven, like the later of the others. It is of conventional plan, with the unit power plant under a European type of hood, a pressed steel frame, and drive through a single tubular shaft with two universals. Other Republic models are of 1,500 pounds, 1 ton and 1½ tons. Details of the new truck are:

| | |
|---|---|
| Capacity | 2 tons |
| Price | $1,575 |
| Wheelbase | 144 inches |
| Tires, front | 35 x 4 |
| rear | 35 x 6* |
| Drive | internal gear |

* 36 x 4 dual $75 extra.

The unit power plant is mounted directly on the pressed steel frame, consisting of a Continental motor, clutch and gearset, supported from a cross-member in front, just behind the radiator and by bell-housing arms at the rear. Details follow:

| | |
|---|---|
| Bore | 3¼ |
| Stroke | 5 |
| S. A. E. horsepower | 22.5 |
| Speed | 15 m.p.h. |

The cooling system comprises a vertical finned-tube radiator through which the water is circulated by thermo-syphon action. A Stromberg carbureter and a Kramer suction governor are used.

From the motor the drive is taken by a dry-disk clutch and three-speed selective gearset through the tubular shaft to the Celfor axle. Torque and propulsion are taken by the semi-elliptic rear springs. Both sets of brakes are on the rear axle, the hand brakes being internal and the foot brakes external, with both levers in the center of the cab.

Left steer is used, the spark advance being fixed, so that the only engine control is by the throttle. Wheels are of wood with square spokes, fourteen being used front and rear.

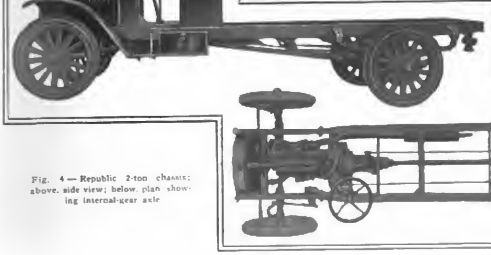

Fig. 4 — Republic 2-ton chassis; above, side view; below, plan showing internal-gear axle

## Four New Kelly Models

CONTINUING all previous models, the Kelly-Springfield Motor Truck Co., Springfield, O., announces for its 1916 offering four new models of the same type as previous models but of different capacities, and a few minor changes in the construction of all models.

Prices on the continued models are unchanged, and those on the new ones are consistent. The catalog embraces capacities of from 1 to 6 tons inclusive, seven models in all:

| | | Wheel- | Tires— | | |
|---|---|---|---|---|---|
| Capacity | Price | base | front | rear | Drive |
| 2,000-lb. | $2,000 | 120* | 36 x 3½ | 36 x 4 | chain |
| 3,000-lb. | 2,050 | ..... | ..... | ..... | chain |
| 4,000-lb. | 2,750 | 144* | 36 x 4 | 36 x 4d | chain |
| 7,000-lb. | 3,400 | 150* | 38 x 5 | 38 x 5d | chain |
| 8,000-lb. | 3,600 | 150* | ..... | ..... | chain |
| 10,000-lb. | 4,250 | 150* | 40 x 6 | 40 x 6d | chain |
| 12,000-lb. | 4,300 | 150* | ..... | ..... | chain |

*Other lengths optional.

All models follow the same lines, as follows: The motor is under a French hood, with the radiator on the dash, the hood being louvred in front and fitted with screened openings in the sides. The gearset is incorporated with the jack-shaft, final drive being by double chains.

Frames are of pressed steel, and flexible, and all models have left steer and center control.

Only two motors are used in the entire line, the smaller being fitted to the 1-, 1½- and 2-tonners and the larger to the 3½, 4-, 5- and 6-ton sizes. The small motor is 3¾ by 5¼ and the larger 4½ by 6½, the former being block cast and the latter cast in pairs.

The small motor is of the L-head type and the larger a T-headed form. Eisemann automatic-advance single ignition is used on all models, as previously, and the new Rayfield GL-2 carbureter has been installed in all models.

The principal change in Kelly construction has been in the oiling system of the motor. The lower half of the crankcase in the new series is made in two sections, the lower of which constitutes the oil reservoir and is covered over with one big screen. This gives a

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straining area of about 2,500 square inches. The capacity of this reservoir is 2½ gallons. As previously, the pressure oiling system is employed, there being no splash.

Kelly models are characterized especially by their flexible frames, the independent mounting of the radiator on four springs, having no connection with the dash, and the brake and radius rod assembly by which the brakes are carried by the radius rods, free of the axle.

## Kissel ½-ton, $950

DESIGNED for the quick delivery of packages, the 1,000-pound model in the line of the Kissel Motor Car Co., Hartford, Wis., announced in THE COMMERCIAL VEHICLE of July 15, represents a conservative design on strictly commercial lines. The unit power plant is located under the hood and drives by direct shaft to the bevel-driven rear axle. Its outline is as follows:

| | |
|---|---|
| Capacity | ½ ton |
| Price | $950 |
| Wheelbase | 115 inches |
| Tires, front | 32 x 4 |
| rear | 32 x 4 |
| Drive | bevel |

Tires are pneumatic and interchangeable. The unit power plant is mounted directly on the mainframe and is of Kissel design. Its valves are to the right, the carbureter being on the left side and communicating with the valves through a cored-out manifold. It has a bore of 3⅞ and a 5½-inch stroke, the cylinders being block cast.

S. A. E. rating gives it 24.22 horsepower and the centrifugal governor restricts it to 1,160 r.p.m. This speed, with a 4½ to 1 reduction on high gives a maximum truck speed of 22 miles per hour.

Water circulation is induced by a centrifugal pump, through a square-tube sheet-metal radiator, cooled by a belt-driven fan blast through the characteristic double-louvred hood. Eisemann single magneto ignition is controlled by hand advance.

The fuel is fed to the Stromberg carbureter by the Stewart vacuum system from a cylindrical tank under the seat. This permits the Model HB carbureter to be carried high and bolted directly to the cylinder block. Circulating-splash lubrication is employed.

A cone clutch connects the motor with the three-speed selective gearset, and a shaft with one universal drives the floating rear axle. The shaft is double-jointed, torque and propulsive stress being taken by the rear springs.

Brakes are side-by-side on the same drums, both external, the hand brake lever being in the center with the gear-shift lever. Left steer is used.

## Rear-wheel Bus Fenders

FENDERS for motor trucks and buses have become an issue in several cities of late times, the front-end cow-catcher type being almost universally boosted heretofore. The Fifth Avenue Coach Co., New York City operator of 150 buses on Fifth avenue, Riverside Drive, Seventh avenue and other drives, has made a study of the question which has resulted in the development of a new type of fender which is fitted to the rear wheels instead of the front wheels.

These fenders are of wood slats supported by metal ribs and are arranged to curve outward, away from the body as they extend backward. At the bottom is a rail that flares out farthest, being shaped like a scoop at the back.

Last year the Fifth Avenue company injured one pedestrian in over 1,500,000 miles of service, which record it attributes to the caution of its drivers. Such accidents as did occur, the officials have found are due to the pedestrian colliding with the vehicle rather than the vehicle with the pedestrian, so that it is the hind wheel and not the front one which strikes him.

This is due to the fact that the driver can turn the vehicle or stop it in time to avert collision if the thoughtless walker is in front of the bus, but is he steps out when the bus is nearly upon him, he usually brings up against the side of the car, out of sight of the driver and directly in the path of the rear wheel.

The rear wheel guard is not unsightly, it does not constitute an additional menace through protruding beyond the front of the vehicle, it does not interfere with access to the crank, cab or motor and it does not increase the overall length of the vehicle.

The entire fleet of 150 buses was equipped with the fenders, designed and built by the Fifth Avenue company, from the time the buses returned from their last runs Saturday night, July 17, and 4:00 a. m. Sunday, July 18.

These fenders resemble the type which the London General Omnibus Co. has recently applied to its buses. They cost $7.50 for material and labor, and might no doubt be made in quantities for general sale at slightly more than this with a good profit.

Fifth Avenue De Dion double-decker, showing new rear-wheel fender in application. Note that it does not protrude beyond the body, and yet adequately covers the rear wheel

## OSTRUP'S ORGANIZATION OMNISCIENT

(Continued from page 13)

ance of operating inspectors in each of the seventeen districts into which the northern territory is divided. These men cover each section once or twice a month, according to the area comprising the section, and then among other duties send a written report to him in New York City.

These men provide the proper inspection which Ostrup's trained technical assistants had recommended. These inspections also reduced the cost of repairs, but not to as small a figure as he thought it should be. When the vehicles were in need of major repairs they were formerly sent to the nearest branch or agent of the manufacturer. Under this method the cost was high and the time the vehicles were laid up was often long.

Ostrup reduced the cost of repairs by establishing his own repair shops in all of the large cities in each district. These are owned and operated by the Texas company exclusively for the repair of its trucks. By eliminating the profits of the branch houses or agents which formerly made the repairs, they have reduced the cost to one-third what it was before they were established. In addition, the average number of working days per truck per month has been increased from 18 to 24 days out of a possible 25 or 26.

He also found that drivers who had been engaged on passenger cars or other types of trucks were unsatisfactory as drivers of oil trucks, because they complained that there was too much manual work in lifting the cans or barrels of oil. The drivers of the horse wagons which the trucks replaced were found in many cases to give the best results after they were instructed how to drive.

Ostrup is a distinguished-looking man, tall, broad-shouldered and massive with light hair and blue eyes, a typical Dane. He was born in Denmark 47 years ago. He received his engineering training in the United States and acted as a consultine engineer and professor of engineering subjects in various universities in this country before joining the Texas organization. While not a motor truck engineer even now, his success in the operation of his vehicles has been due to his engineering training, his analytic propensities and his genius for organization.

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## NUMBER OF U. S. TRUCKS

### Seventy-seven Trucks in U. S. Army Service—$23,043,638 Export Gain

To the Editor, COMMERCIAL VEHICLE: In view of the large number of motor trucks of all kinds, both foreign and American-made, now in use by the warring nations of Europe, please advise me as to the number of motor trucks now owned and in the service of the United States Army.

2—What steps has the United States Government taken to develop a type or types of motor trucks suitable for war purposes in this country?

3—Where are the motor trucks now owned by this country stationed and what kind of work are they engaged in?

4—How many American-made motor trucks have been exported since the beginning of the present war and what is the total approximate value of such exportations?

5—Are such shipments abroad increasing at the present time or are they decreasing?—Constant Reader, New York City.

1—Seventy-seven motor trucks were owned by the United States Army on June 30, 1914, according to the last annual report of the quartermaster general of the United States that has been issued. A number of trucks have been purchased by the war department since that time, but the number cannot be stated definitely because the annual report for the year ending June 30, 1915, has not yet been published.

2—Practically no steps of any consequence have been taken by our government for the development of motor trucks especially suitable for war purposes. In this respect our government has been far behind practically all countries in Europe, which carry out every year most extensive tests of motor vehicles of all kinds. These trials are held to determine whether the trucks participating have sufficient merit to enable them to receive the truck subsidies which those countries grant. As the United States Government does not subsidize privately-owned trucks which can be called to the colors in time of war, no such tests have been held in this country.

3—Of the seventy-seven trucks owned by the army on June 30, 1914, sixty were stationed in the United States and seventeen in the Philippine Islands and Hawaii. These trucks are used as supply vehicles; wireless stations; ambulances, buses, etc. Of the entire seventy-seven trucks in use, thirty were purchased during the fiscal year ending June 30, 1914.

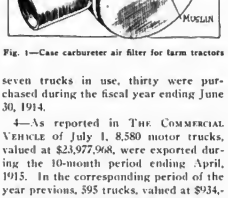


Fig. 1—Case carbureter air filter for farm tractors

4—As reported in THE COMMERCIAL VEHICLE of July 1, 8,580 motor trucks, valued at $23,977,968, were exported during the 10-month period ending April, 1915. In the corresponding period of the year previous, 595 trucks, valued at $934,330, were shipped abroad, so that the increase of 1915 over 1914 for this period was $23,043,638.

5—In April, 1915, there were exported 2,267 trucks, valued at $5,240,481. This is the largest number of trucks which has been shipped in any month since the war began, so that up to April the exports may be said to be on the increase, although during November and December, 1914, the exports were less than those of the preceding months.

## AIR FILTER FOR CARBURETER

### Dust Screens as Used on Farm Tractors Are Simple Appliances

To the Editor, COMMERCIAL VEHICLE: Will you kindly inform the writer regarding the dust filter mentioned in connection with Mr. Rose's paper on farm tractors read at the summer meeting of the S. A. E. and printed in THE COMMERCIAL VEHICLE of July 1, 1915?—L. J. Pholly, Buffalo, N. Y.

Fig. 1 shows the type used on the small tractors of the J. I. Case T. M. Co., Racine, Wis., and is fairly representative of these devices. A number of different types of dust filters have been experimented with and several patents taken out. The Case device consists of a drum on the end of the carbureter air intake over which disks of muslin are stretched and secured by spring rings.

The virtue of this type is its simplicity, although it will naturally retard the intake of air.

## REMOVING MOTOR CARBON

### Frequency of Harmful Deposits Depends Upon Operating Conditions

To the Editor, COMMERCIAL VEHICLE: How quickly will sufficient carbon collect in a gasoline engine so as to make it necessary to clean out the cylinders?

2—In the average life of a motor how many times must carbon be burned out:

3—What is the average cost for burning carbon out of motors?

4—Are there any preparations on the market for mixing with the gasoline that will eliminate carbon without damage to the motor?—F. M. Lawrence, secretary, George Batten Co., New York City.

1—This will depend entirely upon the care which the motor receives, the kind of oil employed, the rate at which it is fed, and the accuracy of the carbureter adjustment. The manner in which the spark is handled has something to do with carbonization also. Some users do not need to clean out carbon oftener than once in 3 years, others find a carbon deposit in their cylinders after only a few days.

The proper kind of oil will not leave a great deal of carbon when it burns, such as it does leave being soft and readily dissolved and blown out by the injection of a little kerosene in the warm cylinders or by squirting a little water in the carbureter air inlet when the motor is running.

Any oil will carbonize, however, if it is fed too copiously, constantly or at times. An over-rich gas mixture will also cause carbon deposits. A late spark will act very much as an over-rich mixture.

2—See answer to Query 1.

3—Most garages charge 75 cents.

4—There are a number such. For a list refer to The Automobile Trade Directory, page 488.

## INCLOSED CABS FOR DRIVERS

To the Editor, COMMERCIAL VEHICLE: We operate a 2-ton Hewitt, 3- and 5-ton Macks and a 3½-ton Alco trucks and we are taking up the question of the advisability of inclosing the driver's seat for the winter months. Where can they be bought?—W. S. Kennedy, purchasing agent, Kirkman & Son, Brooklyn, N. Y.

A dry, warm driver will work more effectively than a cold, wet one. He will not find it necessary to stop by the wayside where he can find a hot stove and a cool drink so often. Any body builder can equip your trucks.

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# Accessories for the Truck

## MORRIS HAND HOISTS FOR TRUCK LOADING

Designed especially for increasing motor truck efficiency by reducing the time of loading and unloading, the Herbert Morris Crane & Hoist Co., Ltd., Toronto, Can., recently installed a new type of hand-operated hoist at the plant of the Toronto hydro-electric system for loading and unloading 3-ton rolls of cable. The hoist, which is of the differential block-and-fall type, is mounted on a small carriage which runs along a horizontal I-beam supported on two steel uprights, approximately 20 feet above the ground so that the truck may drive under it.

The outstanding feature of the crane is a patented self-lowering device which makes it possible to let even a 3-ton load lower itself under gravity. The lowering of the load is accomplished by means of a light hand chain which is rendered fool-proof by an automatic centrifugal governor brake that prevents a too rapid descent of the load. This brake is so designed as to permit the empty hook to be pulled down quickly by hand, thus eliminating the time usually spent in this operation in the ordinary type of chain-block.

The load is lifted by means of a special steel bail, the vertical arms of which have holes near the bottom in which the bar through the center of the roll is inserted. The arms are bolted to the horizontal top member of the bail. Three sets of bolt holes are provided in the top member, so that the arms are rapidly adjustable for any width of cable drum.

Fig. 1—Morris hand hoist loading a trailer

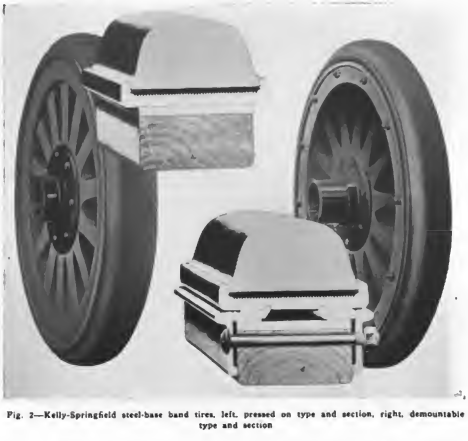

Fig. 2—Kelly-Springfield steel-base band tires, left, pressed on type and section, right, demountable type and section

The use of this hoist has enabled one man to attend to all the loading and unloading at the Toronto plant, whereas before it was put into service, six or seven men were necessary.

## KELLY-SPRINGFIELD BAND TIRES

In addition to its line of sectional block tires which have been the chief product of the Kelly-Springfield Tire Co., Akron, O., steel-base band tires in both demountable and pressed-on types have recently been announced.

The outstanding feature of the Kelly band tire is a protecting flange at each side to prevent abrasions of the rubber at the base when the curb or other obstructions strike the side of the tire. These flanges are deep enough to overlap part of the tread rubber and are serrated like the base to provide a mechanical bond for the hard-rubber subbase.

Fig. 2 shows single tires in both demountable and pressed-on types applied and in section. These types are also adapted to dual mountings.

## ECLIPSE PORTABLE LOADER AND UNLOADER

Built to transfer broken stone or similar material from bottom-dump gondola cars and load it into motor trucks without the aid of shovelers, the Eclipse portable unloader and loader, made by the Galion Iron Wks. & Mfg. Co., Galion, O., consists of a wood hopper on wheels with chutes on one side for loading the trucks; a derrick operated by a gasoline motor which hoists the material in a bucket from a pit constructed partly beneath the track into which the material is deposited direct from the car.

The hopper is mounted on posts sufficiently high to allow loading into the trucks by gravity through three chutes at the bottom. Hinged legs are provided at the bottoms of the posts which are swung down to take the load off the wheels and their axles when the unit is not being moved.

The derrick frame is mounted on top of the hopper. Leading down from the base of this frame on the side of the hopper nearest the railroad track is an inclined wooden chute which extends clear down to the bottom of the pit dug partly beneath the track. A ¾-yard steel bucket, attached to a cable running over a pulley at the top of the derrick frame and thence down to the drum on the gasoline motor mounted beneath the bottom of the hopper, is slid up and down the inclined wooden chute.

The pit dug near the track is rectangular in shape with one side sloping up under the track between two ties to accommodate a steel chute which catches the stone as it drops from the bottom of

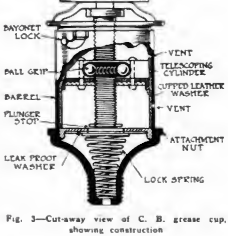


Fig. 3—Cut-away view of C. B. grease cup, showing construction

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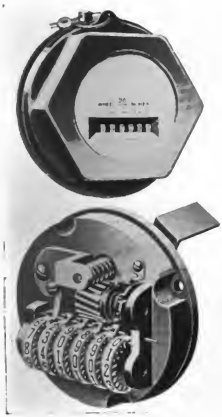

Fig. 4—Stewart hub odometer in hub-cap and with its mechanism exposed

the hopper car. This chute has a gate at its lower end which controls the flow of the stone from the car.

In operation, the bucket is lowered into the pit, the chute gate lifted and the stone allowed to run into the bucket until it is filled. The gate is then closed and the bucket hoisted to the top of the hopper where it is automatically tripped, dumping its load therein. One man can attend to the entire process, the driver of the truck opening the chute gates after his vehicle has run along side of the hopper to be loaded.

The unit is made in two sizes, of 15- and 50-ton capacities. It will unload practically any material which will pass through the bottom gates of the hopper cars furnished by the railroads. It is said to be able to handle 40 tons of crushed stone per hour at a cost, from the car to the truck, of approximately 2 cents per cubic yard, or slightly less than 1 cent per ton, figuring the weight of stone to be 5,400 pounds per cubic yard.

The unit in actual operation is shown in Fig. 5. The line drawing, also Fig. 5, shows the position of the device and the pit in relation to the car track.

## STEWART OILPROOF HUB ODOMETER

Recently run continuously in an oil bath for 2 weeks, a Stewart motor truck hub odometer, made by the Stewart-Warner Speedometer Corp., Chicago, registered 17,438.2 miles during this period without a particle of oil getting into the instrument. The Stewart device is made in two models, one which registers the forward movement only and the other movement in both forward and backward directions.

Each consists of a telescopic cylindrical case which may be slipped into any form of special hub cap. The latter has a circular opening at the end to permit the registering dials to be read. These are of the cylindrical type and register up to 99,999.9 miles.

The instrument revolves with the wheel and is driven by means of a projection on its back which engages the cotter pin in the spindle bolt of the axle.

## C. B. GREASE CUPS

C. B. grease cups, made by William J. Bailey, Newark, N. J., are of the plunger type with telescoping cylinders so that none of the grease can squeeze out at the top. The outside cylindrical barrel of the cup is like the conventional type with a tapering shank at the bottom for the necessary threads. The cover of the cup is integral with the telescoping cylinder which extends clear down to the bottom of the straight-sided portion of the cup. The latter is not screwed into the barrel but contains a pin near the top which is slid into a curved slot in the cup barrel and turned around until it is at the end of the groove. This type of lock, known as the bayonet lock, prevents the telescoping cylinder from jarring off but at the same time permits it to be removed quickly to be filled with grease.

A leak-proof washer is provided at the bottom of the barrel to keep the grease from working up between the telescoping cylinder and the barrel. The circumference of this washer bears against the bottom or open end of the telescoping cylinder. It is held in this position by means of a cone-shaped lock spring which bears against the under side of the washer and the bottom of the barrel shank.

The piston or plunger is made of metal with a cup-shaped leather washer on the bottom to prevent the grease from squeezing past into the upper part of the cylinder. The piston is kept from turning horizontally while being forced downward on the vertical threaded bolt at the center by means of a simple ball grip. This consists of two balls held in a pocket in the piston and separated by a spring. As the piston tends to turn, either one or the other of the balls jams between the rear wall of the pocket and the surface of the cylinder, thus holding the piston stationary.

The vertical screw by which the piston is moved up or down has a pin at its lower end to limit the movement of the piston. At the top it extends out through the top of the telescoping cylinder where it is provided with a flat vertical bar for turning with the thumb and finger.

The telescoping cylinder has a small vent near the top and the barrel one of similar size near the bottom.

The cup is made of brass, either plain or nickel plated, in four sizes, as follows: ⅝-inch, ¾-inch, ⅞-inch and 1-inch. It is furnished either with standard pipe threads or S. A. E. threads.

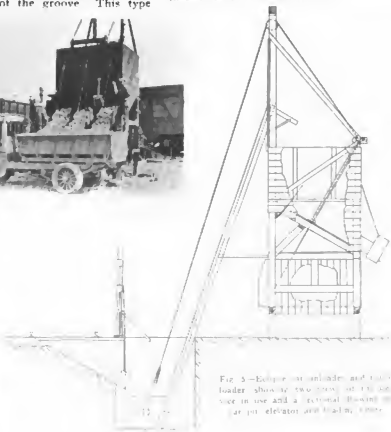

Fig. 5—Eclipse [illegible] unloader and [illegible] loader showing two [illegible] of the device in use and a [illegible] drawing [illegible] car pit elevator and loading [illegible]

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# Men and Makers

**AUTOCAR CO.**, Ardmore, Pa., has increased its production facilities 20 per cent by the erection of an additional three-story and basement building. The power plant and heating furnaces have also been doubled in capacity and a new fire tower is being constructed.

**Republic Motor Truck Co.**, Alma, Mich., is at the present time erecting two new one-story factory buildings. One is to be 30 by 450 feet and will be used as a storeroom. The other, 50 by 100 feet, will be the body shop. The total floor area of these two buildings will be 18,000 square feet. Further extensions are contemplated which will add more than 20,000 square feet of additional floor area.

**Commerce Motor Car Co.**, Detroit, manufacturer of the Commerce 1,500-pound delivery vehicle, has announced its 1916 product, to consist of a single model of substantially the same design as produced for 1915. A new factory unit which doubles the original capacity of the plant has been built, making the capacity of the plant 3,000 trucks annually.

**Burford Motor Truck Co.**, Fremont, O., has decided to erect a large addition to its present plant in that city. H. G. Burford, the president, announced that the company will build a large number of motor ambulances for Red Cross service in France and Belgium. It is expected that the working force will be considerably increased as soon as the new additions are completed.

**La France Fire Engine Co.**, Elmira, N. Y., manufacturer of the La France hydraulic-driven truck, has settled the strike of its 300 boiler makers and machinists and the men have returned to work.

**Velie Motor Vehicle Co.**, Moline, Ill., which heretofore has distributed its passenger cars and motor trucks through the implement dealers which handle the products of the John Deere Plow Co., with which the Velie company is closely allied, has altered its policy and will hereafter sell direct through dealers, eliminating the Deere Plow branches.

**J. L. Case Plow Co.**, Racine, Wis., last week introduced several new types of motor-driven farm machinery to the public at the annual convention of branch managers and salesmen held at the plant. Field demonstrations of the new Wallis tractor and the Case gang plow were given on the big Case farm just outside of Racine.

**R. D. Thurston & Co.**, Trenton, N. J., has recently become distributer for Garford motor trucks for all of southern New Jersey. The concern has taken quarters in the American Mechanics building on east State street. The officers of the company are: R. D. Thurston, president, and J. C. Minge, vice president and general manager.

**Kissel Motor Car Co.'s Chicago Branch** will hereafter handle both the wholesale and retail business of the Kissel company in the Chicago territory. Both classes of business have been consolidated under the management of H. P. Branstetter, for the past 2 years in charge of the distribution of Kissel vehicles in Indiana and Illinois. The headquarters of the Kissel company in Chicago will be at Wabash and Twenty-sixth streets.

**The Republic Sales Co.**, New Haven, Conn., agent for the Republic truck in New Haven, Conn., and vicinity, is now located in its new quarters at 17 Farren avenue, where it has leased the Farren garage.

**Hercules Buggy Co.**, Evansville, Ind., will manufacture a new line of motor truck bodies. About 150 additional workmen will be engaged for this work during the next few weeks.

**Wilson Foundry & Machine Co.**, Pontiac, Mich., expects to double its plant within the next few months and for this purpose has just purchased 10 acres of land. It is expected that the present force of 600 men will be more than doubled.

**Auto Crank Shaft Co.**, Piquette avenue Detroit, has just awarded a contract for the erection of a one-story brick addition to its factory.

**Continental Motor Mfg. Co.**, Detroit, is erecting two four-story additions to its factory in Muskegon, Mich. Both are of reinforced concrete construction. One building is 54 by 150 feet and the other 70 by 330 feet; the latter is V-shaped and extends down to the shore of Muskegon lake. The new structures represent an expenditure of between $300,000 and $400,000; will increase the floor space by over 125,000 square feet, and will permit the doubling of the present force, which now numbers nearly 2,000. The added facilities will raise the Continental production of four-cylinder motors from 4,000 to 6,000 a month. Counting the output of the Detroit plant as well as that in Muskegon, the production of the Continental company between July 1, 1915, and July 1, 1916, will be 8,000 motors monthly, and perhaps more.

**Fuller & Sons Mfg. Co.**, Kalamazoo, Mich., manufacturer of Fuller gearsets, is rapidly completing new factory additions which will enable the company to more than double its present capacity. New machinery is also being installed in those units which are almost completed.

**Bower Roller Bearing Co.**, Detroit, has increased its capital stock from $225,000 to $300,000. The $75,000 increase was paid as a stock dividend. The regular 5-per cent semi-annual cash dividend was paid at the same time.

**Firestone Tire & Rubber Co.**, Akron, O., last week placed contracts for the immediate extension of three wings of its present factory: the doubling of a separate six-story factory building and the construction of a Firestone restaurant. These new additions will add 302,000 square feet of floor space to the

A Denby 1-ton truck pulling through the mire of an important road leading out of Des Moines, Ia., which steady rains had made impassable for 10 days. No vehicle, either motor driven or horse drawn, had been able to negotiate it during this period until the Denby got through with a load of 2,100 pounds and, in addition, hauled a seven-passenger car, the tow rope to which is shown in the above illustration. Note how the Denby is down almost to the wheel hubs

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present factory and will enable the Firestone company to nearly double its output.

**Goodyear Tire & Rubber Co.,** Akron, O., has completed the installation of hydraulic presses in its various branches throughout the country for the purpose of equipping motor trucks with the pressed-on S. V. truck tires.

**Miller Tire & Rubber Co.,** Akron, O., has prepared plans for the erection of a $50,000-addition to the six-story building, 109 by 154 feet. Another smaller building, one store and basement, 57 by 40 feet, will also be put up. The cost of these two structures, with other additions which have been made during the past year, will bring the total building expenditures close to $200,000.

**McGraw Tire & Rubber Co.,** East Palestine, O., has recently petitioned the Municipal Council of the city to vacate several streets in the vicinity of the plant, so that several large additional factory buildings may be erected. If this petition is granted it is expected that the force of the McGraw company will be increased by more than 1,000 additional workmen.

**Remy Electric Co.,** Anderson, Ind., is at present moving its engineering and sales departments to its new building in Detroit which has just been completed. In the future all business pertaining to engineering or sales matters will be handled from Detroit. The manufacture of Remy lighting, ignition and starting equipments will still be carried on at Anderson. Contracts have just been let for the construction of two additional buildings at the Anderson plant which will bring the total up to twenty-six. From the orders now on the Remy company's books, it is expected that this year's output will be many times greater than any other year in the history of the concern.

**Sewell Cushion Wheel Co.,** Detroit, has enlarged its factory at Gratiot and Beaufait avenues, in order to enable it to keep pace with increased orders.

**Burd High Compression Ring Co.,** Rockford, Ill., has just begun the installation of machinery in its new factory building which was completed some time ago. The new structure has a floor area of approximately 30,000 square feet. Its construction was made necessary by the lack of space in the other buildings to enable the company to keep up with its orders.

**Packard Electric Co.,** Warren, O., manufacturer of electric cable, has opened an office in Detroit at the David Whitney building. W. L. Marsh is in charge.

**Rands Mfg. Co.,** Holden avenue, Detroit, manufacturer of motor vehicle windshields, has recently awarded the contracts for the construction of a three-story concrete factory addition to its present plant. The cost of the new building will be about $20,000.

**Hartford Machine Screw Co.,** Hartford, Conn., has leased the brick plant formerly occupied by the Hartford Dairy Co. and more recently by the Pratt & Cady Co. Alterations now being made will be completed about the middle of August, at which time the company will install new machinery. The building is of brick, two stories and basement in height, with a floor space of approximately 48,000 square feet.

**Pittsfield Spark Coil Co.,** Dalton, Mass., has secured a brick factory in Pittsfield, Mass., the city where the company began business 12 years ago, and will move its plant to the new quarters immediately. All correspondence, inquiries and orders should be sent to the Pittsfield address to avoid delay. Orders may also be sent to any of the branches of the Western Electric Co., distributing agent of the Pittsfield company.

The famous Liberty Bell started on its transcontinental trip to the Panama-Pacific Exposition from its home in Independence Hall, Philadelphia, Pa., on a pneumatic-tired 1½-ton White truck, as shown in the above illustration. This was the first time that the famous old bell had ever ridden on a motor truck. It was conducted from Independence Hall to the railroad station by a guard of honor and then loaded onto a specially-constructed flat car for its trip across the country. The large crack in the famous heirloom, which for a time mitigated against its being sent across country for fear it would open still further while en route, was not lengthened while the bell was being carried by the truck. The latter was gaily decorated with festoons of flowers and bunting

**Booth Felt Co.,** Brooklyn, N. Y., manufacturer of felt washers, has opened a new branch at Twelfth street and Grand Trunk railroad, Detroit, to cover the motor vehicle industry. Another branch is located in Chicago.

**O. E. Hunt** has been appointed chief engineer of the factory engineering organization of the Packard Motor Car Co., Detroit. For several years he was assistant to J. G. Vincent, vice president of engineering for the Packard company. The Packard engineering staff is claimed to be the largest in the motor truck industry, to comprise more than 200 men and to spend between $400,000 and $500,000 yearly for development work.

**C. F. Rouze** has been appointed sales manager of the Knox Motors Associates, Springfield, Mass., an association recently formed to act as the sole distributer of the products of the Knox Motors Co., of the same city, maker of the Knox tractor. Mr. Rouze succeeds H. F. Blanchard, who only recently resigned as sales manager of the Knox Motors company. Mr. Rouze had been in charge of the Knox branch office at Kansas City, Mo., since February, 1914. Since 1909 Mr. Rouze has been connected with the motor truck and tractor business, having been successively associated with the Rapid Motor Transportation Co. as sales representative; with the motor truck department of the United Motor Co. as western supervisor, and with the American Locomotive Co. in a similar position. It was from the latter position that he joined the Knox organization at the Kansas City branch.

**Day Baker,** New England manager of the General Vehicle Co., Inc., Long Island City, N. Y., has just been appointed manager of the agency sales, foreign sales and central station departments of the General Vehicle company. The business of the General Vehicle company in its American and foreign agencies has been growing rapidly for some time past, and it is Mr. Baker's task to systematically organize and coordinate these departments. Mr. Baker is treasurer of the Boston Commercial Motor Vehicle Assn., a former president of the Boston Electric Motor Car Club, a former treasurer of the Electric Vehicle Assn. of America, and a member of many of the motor vehicle associations and clubs in New England. He accepted his new position last week, after his return from a trip to California for his health.

**G. D. Wilcox, Jr.,** formerly connected with the Regal Motor Car Co., has been appointed advertising manager of the Republic Motor Truck Co., Alma, Mich.

**C. T. Kentworthy** has recently been appointed eastern district manager of the Baker-R. & L. Co., Cleveland, O. He was formerly manager of the New York City branch of the Rauch & Lang Co.

**Charles Balough,** identified for the past 5 years with the Kelly-Springfield Motor Truck Co., Springfield, O., as chief engineer and works manager, and who resigned from that company last June, has taken up the development of a new commercial motor vehicle in Springfield, O., where he has secured headquarters at Columbia street and Dakota avenue.

**T. A. Boyle** has recently been promoted to the position of advertising manager and manager of the service department of the F. B. Stearns Co., Cleveland, O. Until his promotion Mr. Boyle was assistant advertising manager. He has been identified with the Stearns company for the past 8 years.

**Earl C. Anthony** will handle the distribution of both Reo passenger cars and motor trucks in California. San Francisco will be the distribution center for the northern half of the state, while

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the requirements of the southern portion will be handled direct from the Anthony headquarters in Los Angeles.

**Guy W. Vaughn,** for the past 2 years chief of the experimental department of the B. F. Stearns Co., Cleveland, O., has been appointed special sales representative.

**F. W. Post, Jr.,** has recently been appointed sales manager of the New York City office of the F. B. Stearns Co., Cleveland, O. With Secretary Thomas R. Jacobs he will carry on the duties previously performed by W. A. Lesser, who was killed last month in a motor vehicle accident.

**Eugene P. Herrman** has been elected secretary and treasurer of the Republic Motor Sales Co., New York City, distributer of Republic trucks in the New York territory. He was formerly vice president of the Sternberg Motor Truck Co., Milwaukee, Wis., for the past 4 years.

**F. A. Welch** has been appointed manager of the new wholesale branch of the Studebaker Corp., Detroit, recently opened in Cincinnati, O. He was formerly associated with the Blevins Auto Sales Co., Toledo, O.

**J. L. DeBerry,** the Brunnell Auto Sales Co., Toledo, O., has recently been made manager of sales in the northwestern territory of Ohio for the Federal truck, made by the Federal Motor Truck Co., Detroit.

**A. W. and M. J. LaRoche** have been appointed eastern distributers for the Velie Motor Vehicle Co., Moline, Ill., under the firm name of LaRoche Bros. Salesrooms have been secured at 506-508 north Broad street, Philadelphia, Pa.

**O. L. Formigle** has resigned as assistant engineer of the Sheldon Axle Spring Co., Wilkes-Barre, Pa., and will spend the summer at his home in Haddon Heights, N. J.

**D. F. Graham,** sales manager of the Bower Roller Bearing Co., Detroit, has recently resigned from that company. He has announced no plans for the future.

**P. W. Litchfield,** factory manager of the Goodyear Tire & Rubber Co., Akron, O., last week donated $100,000 to the welfare work among the 7,300 employes of the Goodyear company. The announcement of this gift, which amounts to Mr. Litchfield's pay for 15 years, was made at a banquet tendered in his honor at the Portage hotel last week to celebrate the fifteenth anniversary of his connection with the company.

**Stephen Douglas** has succeeded Earl McCookin as sales manager of the Detroit office of the Stewart-Warner Speedometer Corp., Chicago, and will handle the sale of Stewart-Warner motor vehicle accessories in Michigan. Mr. Douglas has been in the east for the Stewart-Warner company for the past several months. Russell Baldwin will handle the sales of the company's speedometer equipment to the Michigan trade.

**H. L. Grimsell** has recently been promoted to the management of the Detroit branch of the Findeisen & Kropf Mfg. Co., Chicago, manufacturer of the Rayfield carburetor. He was formerly at the Chicago office of the company.

**A Denby Branch in Paris** has been organized by E. D. Chenvert and Beckworth Havens, special representatives recently sent abroad by the Denby Motor Truck Co., Detroit. The new branch will permit the Denby company to keep in close touch with the foreign motor truck business.

**R. M. Anderson,** formerly engineer for the Stromberg Motor Devices Co., Chicago, has resigned from that position to become assistant to Chief Engineer Winkler of the J. I. Case T. M. Co., Racine, Wis.

**C. J. Caldwell** has sold out his interests in the Master Carburetor Co., Detroit, and is now connected with the H. A. Miller Mfg. Co., Los Angeles, Cal., which will shortly bring out a new carburetor.

**William S. Carlston,** for the past 8 years assistant to George Kingston of Byrne, Kingston & Co., manufacturer of Kingston carburetors and mufflers, has been appointed chief engineer of that company.

**Pierce-Arrow Agency Officials Met in Boston, Mass.,** last week in a 2-day conclave, with J. W. Maguire, the Boston agent, playing the part of host. Some of those present were: Col. Charles Clifton, of Buffalo, N. Y.; R. D. Gerton and C. W. Cady, of New York City; Charles Hanhuer, of Cincinnati, O.; D. E. Odell, of Minneapolis, Minn.; Grant Waldraf, of St. Paul, Minn.; C. R. Clifford and E. H. Stoddard, of Springfield, Mass.; H. Paulman, of Chicago; W. H. Ellis, of Newark, N. J.; Herman May, of Pittsburgh, Pa.; Samuel Bereaon, of St. Louis, Mo.; J. B. Westfield, of New Haven, Conn.; W. J. Foss and W. R. Fassett, of Philadelphia, Pa., and E. C. Bull, W. Newman and R. O. Patten, of Buffalo, N. Y.

**Kelly-Springfield Tire Co.** has won an old suit against the Diamond Rubber Co., of New York, for the infringement of the Grant patent on an imbedded-wire solid tire. The Federal court has just confirmed the accounting which orders the Diamond company to pay $212,376.29 to the Kelly-Springfield company. When the suit began 18 years ago the Kelly-Springfield company was known as the Consolidated Rubber Tire Co. The Diamond company is now a Goodrich property.

**Fisk Rubber Co.'s Plant Was Damaged By Fire** last week to the extent of $15,000. The fire spread to the yard of the Fisk company, where a gasoline explosion started a conflagration which burned up building material and four freight cars valued at $15,000.

**Goodyear Tire & Rubber Co.,** Akron, O., has sent special representatives to India, Australia and South America. As the nations at war are using the entire output of their factories for war purposes, the competition of foreign tire manufacturers in these countries has been greatly lessened and it is the aim of the Goodyear Tire & Rubber Co. to secure its share of the export business. In the countries which the Goodyear plans to enter tires have been selling at exorbitant prices, so that Goodyear's entrance should prove a welcome to all tire users.

**The Goodyear Goat** is a real live, sure-enough goat, with whiskers and horns. He visits monthly the sales district of the Goodyear Tire & Rubber Co., Akron, O., that has done the greatest amount of business in that particular month. He has been named Violet, although it has been suggested that Sweet William would be a more appropriate designation for his highness, as he could then be associated with flowers. Recently the Philadelphia, Pa., manager of the Goodyear company was horrified to receive a telegram that the goat was on his way by express. A consultation was immediately called to decide upon Violet's disposition. After a meal of whatever was not nailed down at the Goodyear branch, however, Violet behaved himself admirably and settled down to a quiet life to await his summons to appear at some other branch.

**Trucks Carried Chicago Telephone Operators During the Strike** of the street and elevated railway employes in that city recently and enabled the Chicago Telephone company to maintain its service during the 2 days in which all of the trolley and elevated cars were idle. The greatest problem of the telephone company was the transportation of its 6,000 operators from their homes to the down-town exchanges. One of the vehicles used by the company for this work was a Knox tractor and 30-ton trailer. This unit, which is perhaps of the largest in use, was described in the December 15, 1914, issue of THE COMMERCIAL VEHICLE. Ordinarily it is used to haul large reels of lead-covered conduit cable.

**First Electric Truck in Edinburgh, Scotland,** a 1½-ton American-made vehicle, has recently been put into service by a committee in charge of the Edinburgh municipal electric plant to encourage the use of electric trucks and passenger cars. The committee has undertaken to supply electric current at the rate of 2 cents per kw.-h. for the charging of such vehicles and has made arrangements for the storing of electric trucks in the municipal electric stations.

**Jeffery Four-wheel-drivers Are Good Mud Larks,** according to an American consul in England who observed the work of the American-made motor trucks on Salisbury Plain, England, previous to their embarkation for the seat of war in Belgium and northern France. According to the report of the American consul, he motored about 40 miles to the camp of the Canadians with an American officer. As the roads were very muddy he noticed many trucks stuck in the mud. In one place he saw a Jeffery four-wheel-driven truck with ten men aboard pushing behind the mud at a fair speed with its axles almost in the mud. The British driver of the Jeffery is said to have exclaimed: "This blooming Yankee truck can almost swim."

**Eastern New England Overland Dealers Met in Boston, Mass.,** last Friday night at a banquet at the Hotel Lennox as guests of the Connell & McKone Co., Greater Boston distributers for Overland passenger cars and light delivery cars. Seventy-seven dealers were present.

**Exposition Prizes Were Won by the American Taximeter Co.,** New York City, for its exhibit of Transimeter hub odomometer, Recordigraph tape recorder and Jones and Popp taximeters at the Panama-Pacific International Exposition. Highest awards and gold medals were granted for the above instruments.

**A Motor Bus Service in Honduras** is now in operation between the Pacific seaport of San Lorenzo and Tegucigalpa. Heretofore the trip between these two points was made on mulcback and took 2 or 3 days, so that very few traveling men and few of the public generally visited that section. By motor bus the trip from the coast only takes 6 hours, due largely to the excellent macadam road which is kept in good condition at all seasons of the year. The buses make three round trips each week and there is a noticeable increase in the number of visitors in that part of Honduras.

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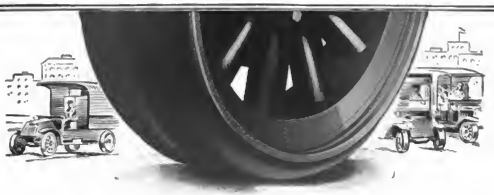

# Truck Tires Free

## Unless the Goodyear S-V Outwears Any Other

**We now extend this Guarantee to October 1st. Many truck owners were not in shape to accept it during April, May and June. And we want every user to have this chance to prove the S-V best.**

*Equip opposite wheels—at the same time—one with a Goodyear S-V, one with any other standard Truck Tire of like rated size, bought in the open market. If the Goodyear S-V fails to cost less per mile than the other, we will return you its full purchase price, making the S-V free.*

Get this guarantee in writing when the tires go on. Equip all the wheels you wish. Compare the Goodyear S-V with every seeming rival in this convincing way. Then you will end all your costly experimenting. Then you will know the truth.

## Mileage Warrants Foolish

The habit has been, with us and with others, to give mileage warrants on Truck Tires. But that's unfair, either to you or us.

Small tires can't do what big tires do. No tire on hard roads can match good-road mileage. A mileage warrant is a simple guess on average conditions. And it must be low enough to meet bad situations.

What we can do—what we do—is to guarantee the lowest cost per mile under like conditions. We guarantee that on the Goodyear S-V, against any tire that's built.

Not alone in the limited, cautious way in which mileage is usually guaranteed. Not only on an adjustment basis. The Goodyear S-V is entirely free, however long you use it, if any tire you match against it shows as low a cost per mile.

GOODYEAR
AKRON, OHIO
S-V Truck Tires

### Why We Dare

We dare do this because we have already made 5000 tests and comparisons. Barring accidents, the Goodyear S-V will surely win against any rival Truck Tire. There are reasons for it. One is more available tread rubber. Another is no creeping, no bulging or breaking, no possible separation. The tread, the backing and the rim are one.

Our local branch will tell you where to get the S-V tires under this signed warrant.

**THE GOODYEAR TIRE & RUBBER CO., Desk 86, AKRON, OHIO**
**Makers of Goodyear Fortified Automobile Tires**
**We Make Demountable, Block, Cushion, Pneumatic and Other Types of Truck Tires**



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# SKF

## ADEQUATE SUPPLIES OF SKF BALL BEARINGS ARE NOW AVAILABLE TO AMERICAN MANUFACTURERS.

The uninterrupted shipments of this Swedish product made and imported under a neutral flag have made it possible for us to maintain regular and satisfactory service for our American customers.

SKF BALL BEARINGS are the result of good design, perfect materials, and the highest type of manufacturing skill in the world. In every field of industrial

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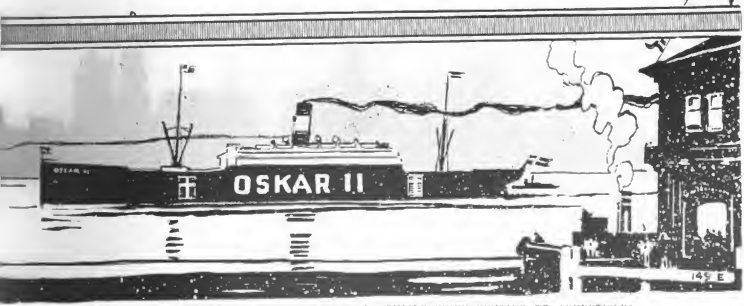
# BALL BEARINGS

activity they have met the most exacting service and have demonstrated in innumerable instances the superiority of the ball bearing principle. Their supremely perfect character has been largely instrumental in the popularization of Ball Bearings wherever bearing duty is greatest. There is no duty too great, no strain too severe, for SKF BEARINGS.

The preference of the greatest American and European builders of high priced automobiles is shown in their selection of SKF BALL BEARINGS.

**SKF**
**THE SWEDISH BALL BEARING**

**SKF BALL BEARING CO.**
50 Church Street, New York City







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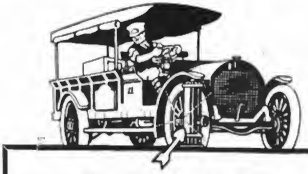

## Can't break it!

TRANSIMETER Hub Odometer is guaranteed against injury to mechanism. The heavy cast housing with wide air space inside gives absolute protection.

# TRANSIMETER

(Hub Odometer)

is grease- and dirt-proof. The figures do not revolve,—always right side up and easily read.

Built for practical men by practical men who know the working conditions of truck operation.

*Highest award at Panama Pacific Exposition.*

**AMERICAN TAXIMETER CO.**
*Mfgrs. of Jones and Popp Taximeters*
131 West 30th Street New York

Capacity, 2 to 10 Tons

Model S. H. 2

**This Body Delivers HARD or SOFT Coal**

Our side and rear delivery screw hoist bodies on motor trucks are elevated by four screws, doing away with annoying chains and broken gears. Operated either by hand or engine power.

***Established Since 1880***

Capacity 2 to 6 Tons Model S. H. 1

Wright's 3 in 1 screw hoist side and rear delivery wagons. Doing away with annoying chains and broken gears. This body is elevated by four screws and can be let down the same as our regular rear delivery chain wagon.

Manufactured by **THE THOS. WRIGHT CO., Inc., Jersey City, N. J.**


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# U. S. MOTOR TRUCKS

—have won the confidence of their owners throughout the world by 5 years of matchless performance, service and durability.

RELIABLE DEALERS WANTED

The Agency Is a Valuable Asset

Capacity
2 Ton
2½ Ton
3 Ton
4 Ton

If you are considering taking on an agency, or should be dissatisfied with present arrangements, WRITE US. Our proposition is a money-maker. Address Contract Dept. D.

**THE UNITED STATES MOTOR TRUCK CO., Cincinnati, Ohio**




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WEST'S CAST-STEEL WHEELS for MOTOR TRUCKS

**Are used by America's leading Truck Builders**

These wheels were designed by, and are built under the supervision of, experienced engineers. They have been thoroughly tested and have proved they will stand hard usage and abuse.

Over 8000 WEST'S CAST-STEEL WHEELS are now used on trucks and not one of them has failed to give satisfaction.

Specify WEST'S CAST-STEEL WHEELS on every heavy truck you buy.

**The West Steel Casting Company**
805-815 E. 70th St. Cleveland, Ohio

# Bearings

We carry in stock for immediate delivery, various types and sizes of Ball and Roller Bearings.

**THE GWILLIAM COMPANY**
New York: 253 West 58th St. Phone Columbus 8356
1314 Arch St., Philadelphia Phone Walnut 3497




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COVERT

TRANSMISSIONS

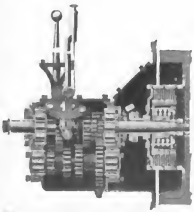
**Right** Design Material Workmanship

have made their impression on automobile designers and engineers with the result that

## Covert Transmissions

are specified for pleasure cars and motor trucks by noted men of the automobile industry.

This recognition of true merit is the result of fifteen years of specializing in the production of trouble-free transmission units. COVERT transmissions are made in a full line of types and sizes and our engineers will gladly show how easily our product is adapted to your particular needs.



The New Covert Unit Power Plant Transmission with Clutch and Control Levers

**Covert Motor Vehicle Co.**

Sales Office Detroit, Mich. — Factory Lockport, N. Y.



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# REPUBLIC DEALERS'
## SALES HAVE INCREASED
# 800%
## IN ONE YEAR

Think of it! ***An 800% increase*** in Republic sales ***in one year.***

The secret of this great success—the foundation of it all lies in the fact that ***there is a Republic Model to meet the requirements of every haulage demand.***

**HERE ARE THE MODELS—**
**HERE ARE THE PRICES—**
**HERE IS THE PROPOSITION—**

| THE MODELS | THE PRICES |
|---|---|
| **Shaft-Drive Internal Gear:** | |
| ¾ ton capacity | **$ 995** |
| One ton capacity | **1275** |
| Two ton capacity | **1575** |
| **Chain-Drive Models:** | |
| One ton capacity | **1350** |
| 1½ ton capacity | **1475** |

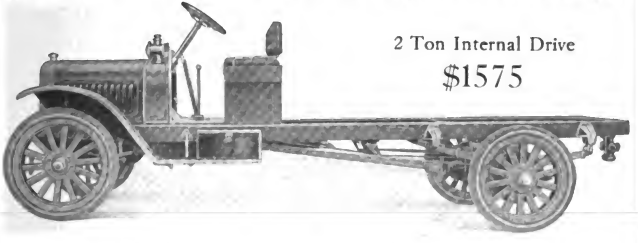
**THE PROPOSITION**

The Republic proposition is live — aggressive — profit-making.

Behind this proposition is an organization, an aggressive sales policy and a reputation that helps sell and keep sold Republic Trucks.

If your territory now has no Republic representative we shall be glad to tell you more about it.

**REPUBLIC MOTOR TRUCK COMPANY, Alma, Michigan**




***"An Honest Truck At An Honest Price"***

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## Four-Wheel Drive Specifications

Wheelbase—3 ton, 122 inches; 6-ton, 140 inches.

Steering—Motor power (operated by hand lever) on all wheels giving positive action to a powerful, sure, fool-proof steering device which makes a remarkably short-turning radius.

Axles—Special patented full floating. Bearings—Rhineland.

Motor—3 tons, 4¼ x 6¼ Waukesha, 3½ x 7 Morton.

Transmission — Morton Selective 4 speeds forward, 1 reverse. Double worm drive to all wheels.

## Morton Worm Drive Specifications

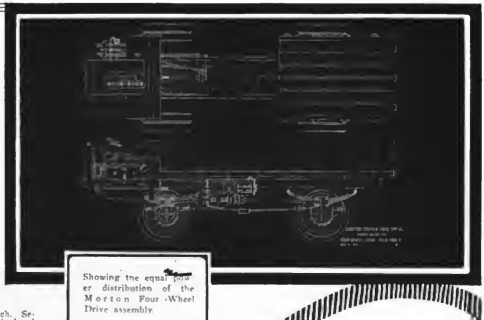
Motor—Continental—4 cyl.—4 cycle.

Carburetor—Carter.

Ignition—Bosch.

Lubrication — Positive plunger pump with constant level.

Centrifugal water pump. Hele-Shaw clutch. Selective transmission. Lever control. Right hand drive. Solid forged axles. Worm-Wheel of special phosphor bronze. All other equipment equally reliable.



Showing the equal power distribution of the Morton Four-Wheel Drive assembly.

# MORTON

Four-Wheel Drive equally distributes the propelling strain over the four axles giving the highest efficiency because every pound of energy is turned into a distributed tractive effort. Morton Four-Wheel Drive Trucks in 3 to 6 ton capacity, are built to withstand the hardest usage and to mount the heaviest grades.

**Morton Worm Drive Trucks**

**1½—2—2½—3½—5 Tons**

Are the perfect vehicles of the light truck field.

## Extra Money For You

Aside from the regular truck business you can increase your earnings and the efficiency of your local fire department by interesting town officials in the finest combination hose and chemical wagon ever built.

Designed by capable engineers who provided every conceivable means for making this a dependable fire fighting unit that will **get to a fire**, regardless of the road it has to travel. The Morton Hose and Chemical Wagon is built of the best material, by the most skilled mechanics obtainable.

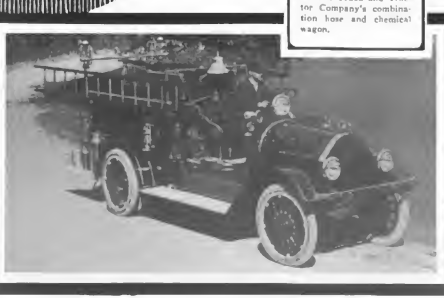
Electric starting, lighting and ignition systems are installed in such manner as to make failure to operate an impossibility. Simplicity is the keynote throughout.

Motor—Continental—6 cylinder four cycle, water cooled, 4⅛ x 5¼—60 H. P. of the unit power plant type. Starting and Lighting—Jesco Combined Starting and Lighting Systems. Carburetor — Carter. Drive—Worm Gear. Brakes—service and emergency on rear wheels. Steering Gear—Irreversible type.

Guaranteed against defective workmanship or material for one year.

Equipment—2 35-gal. chemical tanks connected with by-pass, 200 ft. of ¾-in. chemical hose, 1 extension truss ladder, 1 solid side roof ladder, 2 axes, 2 bars, 8-ft. pole, 2 3-gal. hand extinguishers, acid receptacle, plug for nozzle and all tools for operating tanks and devices.

Morton Truck and Tractor Company's combination hose and chemical wagon.



*Dealers—Communicate for Open Territory*

**Morton Truck & Tractor Company**

Harrisburg Pennsylvania



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# Firestone

## Continuous Service and Longest Service at Low Prices

KEEPING trucks in continuous operation is your problem. Firestone Tires solve it for you. To toughness and durability which give the maximum mileage, the Firestone unites resiliency which positively protects the truck mechanism—gives added insurance against motor troubles, spring axles and cracked frames.

It is the daily evidence of this kind of service at our low prices that explains the increasing demand for Firestone Tires everywhere.

### Firestone Removable Equipment

is another factor of continuous truck service—and so recognized by experienced truck owners. The Firestone Removable Rim Equipment stands alone in its success—proved for years by every test of road, load and condition of service. With this equipment any truck driver can change tires any time without expert help. No delays. No truck lay-offs.

### Firestone Pressed-on Type

The same qualities that make all Firestone Truck Tires supreme—toughness with resiliency—are built into the Firestone Pressed-on Type. These tires can be applied to any S. A. E. wheel in a few minutes at any Firestone Service Station. Forced on by heavy hydraulic pressure, there is no possibility of creeping.

There is a Firestone Truck Tire for every demand. Telephone the Firestone headquarters of your city for full details and prices on tire equipment for your trucks.

**Firestone Tire & Rubber Co.**

*"America's Largest Exclusive Tire and Rim Makers"*

**Akron, Ohio—Branches and Dealers Everywhere**



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# LIGGETT SPRING & AXLE COMPANY

**MONONGAHELA, PA.**

QUICK DELIVERIES

STYLE F. A. 2050

**Front and Rear Axles Complete with Roller Bearings** **Springs—High Carbon or Alloy Steels**

# The Wood Hydraulic Hoist

SOLVES THE DUMPING PROBLEM FOR MOTOR DUMP TRUCKS

"Made in Detroit Only" by the

**WOOD HYDRAULIC HOIST & BODY CO., Detroit, Mich.**

Successors to WOOD HYDRAULIC HOIST CO., St. Paul, Minn.

# EISEMANN

OF THE 93 manufacturers who use Eisemann magnetos in this country, 69 are truck makers.

If you are not one of the 69 Eisemann users you are not getting the greatest possible ignition efficiency.

**The Eisemann Magneto Co.**

Sales and General Offices

**32-33rd Street, Brooklyn, N. Y.**

New York, 245 West 55th Street
Indianapolis, Ind., 415-417 North Capitol Ave.
Detroit, Mich., 802 Woodward Ave.

Reo 2-Ton Truck—Chassis $1,650

# 200—More Orders Than Trucks—200

THAT'S THE SITUATION today—Reo Motor Truck Plant running double time and still can't catch up with domestic demand.

BUT WE'RE BUILDING a new four-and-one-half-acre factory—4½ acres of ground space, not merely floor space—and we hope soon to be able to more nearly cope with the tremendous demand for Reo Trucks.

MEANTIME, Mr. Dealer, it's contracting time and if you want to get in on the big Reo Truck business for 1916—better get busy quickly.

**Reo Motor Truck Company** **Lansing, Michigan, U. S. A.**




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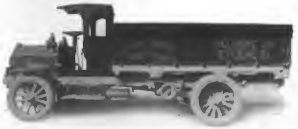
## Always on the Job

Standard DETROIT USA

CHAIN AND CHAINLESS
**TRUCKS**



**Dealers Receive Real Cooperation**

STANDARD Trucks have been sold in almost every large city of the U. S. A. with practically no advertising, which demonstrates that the remarkable mechanical perfection of STANDARD Trucks have won and held the confidence of the buying public. It will pay "live dealers" to investigate our very liberal agency proposition. Send for Booklet B-26 describing all capacities.

**Standard Motor Truck Co., Detroit, Mich.**

## When a Man Buys a Truck

the first thing he wants to know is what kind of a motor it's got. He wants to be sure first of all of the power plant. He wants a motor with a record behind it, a motor that other truck owners have tested out for him, that they have found stands up to the grind of hard, gruelling work day in and day out, year in and year out.

Wisconsin
CONSISTENT
**Motors**

have won their high standing because of the service they have given. They are durable, economical, dependable.

Wisconsin Motor Mfg. Co
Station A, Dept. 319
Milwaukee, Wisconsin

*Write now for special catalog*

TYPE T-U
4" BORE
6" STROKE
INTAKE VIEW

TYPE T-U
4" BORE
6" STROKE
EXHAUST VIEW

## Baker Electric Trucks

**IN the ownership and operation of an electric truck, the recollection of quality remains long after the price is forgotten. It is so much less expensive to *invest* a little more money once for all in a Baker Electric than to *spend it* annually in higher cost of running just an ordinary truck.**

***"Electric Trucks Last Ten Years"***

**THE BAKER, R. & L. COMPANY**

Makers of Baker Coupes, Broughams and Roadsters

CLEVELAND, OHIO

*Branches or Dealers in Principal Cities*
*Live Dealers Wanted in Open Territory*

# MODERN 1915

## GET IN LINE

With your co-operation, we are able to supply you with just the truck that will give the most satisfactory and profitable results in your business—Chain or Worm drive models.

**Model "H" 1½ Ton Chain Drive. Model "L" 1 Ton Worm Drive**
**Model "M" 1½ Ton Worm Drive. Model "P" 2 Ton Chain Drive**

**The Bowling Green Motor Truck Co., Bowling Green, Ohio**

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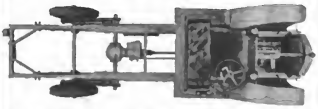
# SOUTH BEND



## Double Duty Trucks

—once put in service—always remain in service.

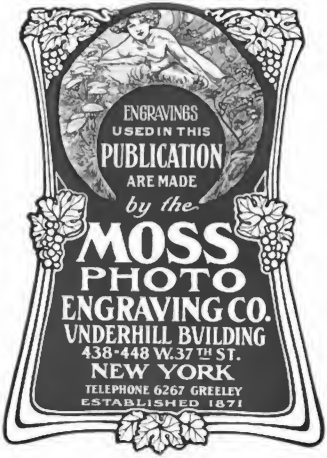
Whatever your business may be there is a SOUTH BEND DOUBLE DUTY TRUCK that will give you the utmost efficiency and satisfaction.

***Wisconsin motors, Warner transmission, Sheldon axles, Ross steering gear, Bosch ignition. Either chain or worm drive.***

SOUTH BEND DOUBLE DUTY FIRE APPARATUS in all cases more than performs its duty.

Attractive Dealer Proposition. Write us at once.

**South Bend Motor Car Works**
**SOUTH BEND, IND.**




# G. V. ELECTRIC TRUCKS

SIX MODELS: 1,000 POUNDS TO 5 TONS

Nearly 5,000 in use
Catalog on request

General Vehicle Company, Inc.
GENERAL OFFICES AND FACTORY
LONG ISLAND CITY, NEW YORK

NEW YORK . CHICAGO . BOSTON . PHILADELPHIA

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Brown-Lipe transmissions and differentials represent the maximum from a standpoint of efficiency and durability.

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# The Veeder Hub Odometer

**is a great convenience on pleasure cars and practically a necessity on trucks.**

This Veeder Hub Odometer registers distance traveled backward as well as forward; there is no way to disconnect it by slipping gears out of mesh. Price, complete, $20. Special model for Ford Cars, $15.

Cyclometers for Bicycles and Motorcycles. Odometers for Automobiles and Horse Drawn Vehicles. Counters for practically every purpose. Tachometers, Tachodometers and Fine Die Castings.

**VEEDER MFG. CO.**

54 Sargeant Street Hartford, Conn.

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ONE FIRM ONE SERVICE

ONE GUARANTEE

BACK OF

EVERY BEARING REGROUND

BY

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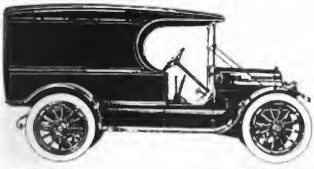

**$850**
*With open body*
*Equipped with Electric Starting and Lighting System*

**Overland DELIVERY CARS**

**$895**
*With closed body*
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*Prices f. o. b. Toledo*

## Increase Your Business Radius

The Overland Delivery Car adds to your area of operations, increases your trade and multiplies your profits.

And its price is less than $900.

*"Made in U. S. A."*

**The Willys-Overland Company**

*Please address Dept. 191*

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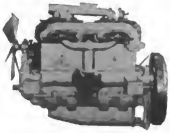

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BEAVER MOTORS are made by truck motor **specialists.** The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quieker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

**BEAVER MFG. COMPANY**

Milwaukee Wisconsin




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BUILT IN AMERICA

*From European Design—With Careful British Shop Practice*

# Burford Trucks

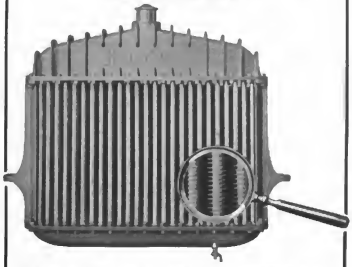
**One- and one-half ton. Internal gear final drive.**

**The H. G. Burford Co.**

**FREMONT :: :: :: OHIO**

# RADIATOR INSURANCE

**The cooling section of this Rome Helical Tube Truck Radiator is guaranteed for the life of the truck.**



**Highest in Quality and Efficiency** **Highest in Price**

*Write us for details*

**ROME-TURNEY RADIATOR COMPANY**
**ROME, NEW YORK**

## "Whitney" Chains

are made by specialists in the foremost organization for chain design and manufacture in America. Our aim is dependability of service under hardest conditions, and our success in this is shown by the standardization of "Whitney" Chains by the leading motor truck makers of the country.

**The Whitney Mfg. Co., Hartford, Conn.**
**Chains—Keys—Hand Milling Machines**



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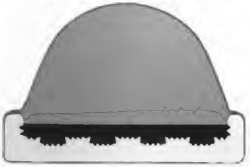
# YOU GET MOST FOR YOUR MONEY

in

## *McGraw Truck Tires*

**Pressed-on Type**

## *Guaranteed 8000 Miles*



**In Mileage**—because more and tougher rubber.

**In Reduced Upkeep**—because the McGraw is the easiest-riding of all solid rubber tires; it best protects vehicles against road shocks.

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***Write and let us tell you more***

**The McGraw Tire & Rubber Co.**

**East Palestine, Ohio, and Principal Cities**

# New Ideal Bodies

increase the efficiency of your truck. Can be made to your specifications to meet your special needs, and shipped anywhere. One pictured here is built on a 5-ton Saurer. Has power hoist, elevating and discharging load in 2 minutes. Rear delivery.

We manufacture bodies to be used on any size or length chassis. Two to ten tons. Hand or power hoist.

Photographs and particulars on request.

**New Ideal Wagon Works**

**1845-47 Park Avenue, near 126th Street, New York**

# Celfor INTERNAL GEAR DRIVE Axles

**For Motor Trucks—Absolutely Quiet**

If you want a strong efficient unit drive that is specially designed for truck work, from one to three tons capacity, write us for complete information about the

# Celfor

## Internal Gear Drive Rear Axle

It possesses marked constructional advantages which commend it to thoughtful designers, engineers and truck makers. We shall be glad to go into these in detail on request.

**Write today for details, catalog and prices**

**Celfor Tool Company**

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Garford

Garford Trucks range from 1500 pounds to six tons in capacity.

They are designed and built by men who have spent their lives in the study of motor trucks.

They are backed by one of the strongest organizations in the industry.

Bodies are provided to meet all requirements.

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The Garford Motor Truck Co., Lima, O.

**Ross Steering and Differential Gears**

**Will Help Sell Your Trucks**

They are

**STANDARD**

on good motor truck construction

**Investigate**

our new complete line of fore and aft steering gears.

Enormous bearing surfaces
Perfect lubrication
Best material throughout
Finest workmanship

Built in the largest and newest steering gear factory in the United States.

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**Cullman Sprockets**

For Diamond, Baldwin and Whitney Chains

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Sprockets in stock and to order

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One of six Jeffery Quads in the service of the United States Army Signal Corps. This is the most powerful portable wireless station in the world. The Jeffery Quad drives, brakes and steers on all four wheels.

The Thomas B. Jeffery Company

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# The United Line

DEALERS—
"Made With
The United"

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| 2 ton Worm Drive Truck | $2250 |
| 3½ ton Worm Drive Truck | 2900 |
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Nothing Experimental—
Nothing Obsolete

Continental Motor
Eisemann Magneto
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**United Factors**
Structural Steel Frame
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Perfection Springs
Timken Axles
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Governor Steering Gear

UNITED MOTOR TRUCK CO. Grand Rapids Michigan



# Cotta "Short Series" Transmission

Always-ready strength is the key note of commercial vehicle transmission requirements.

To meet this demand COTTA "SHORT SERIES" TRANSMISSIONS are built for most gruelling service throughout.

Model 10-C

COTTA "SHORT SERIES" TRANSMISSION is the "strongest transmission built." Its 3 speeds forward and 1 reverse are operated by heavy "dog clutches." Large area of working face assures lasting qualities.

*Insist on COTTA "SHORT SERIES" on your next truck*

**Cotta Gear Co.,** 720-730 Sixth Street ROCKFORD, ILL.

**Horses are cheaper than this**

Driver lost control because the brake lining did not grip and hold the load. Truck out of commission for a fortnight. Repairs—$100. That truck will have a bad economy record for the year.

Properly lined brakes are as important as an efficient motor. See that your brakes are lined with Thermoid.

**Watch Your Brake Lining**

Thermoid is brake lining clear through—not merely on the surface. It holds even when worn paper thin. It is cured under hydraulic compression into a solid substance of uniform density and frictional power. Guard your trucks with Thermoid.

**THERMOID RUBBER CO.** **TRENTON, N. J.**

# Thermoid
## HYDRAULIC COMPRESSED
## Brake Lining-100%

*Our Guarantee:* **Thermoid will make good or we will**



DENBY

# Motor Trucks

Realizing that each business presents its own peculiar delivery and haulage problems, the designers of the Denby have tried to make it, so far as possible, a "made-to-order" truck for each user.

There are four models—¾ ton to 2 tons. Each model is susceptible of chasses and wheelbase modifications which enable it to give "made-to-order" service in almost any line.

Instead of readjusting the business to fit the truck, the truck itself is adjusted to the business.

**Denby Motor Truck Company**
**26 Dubois Street** **Detroit, Michigan**




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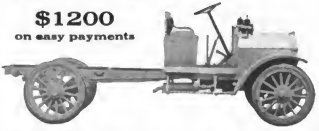
# SPRINGS FOR HEAVY TRUCK DUTY

# CORRECTLY HEAT TREATED

# MADE FOR SERVICE

**THE CLEVELAND-CANTON SPRING CO.**
**CANTON, OHIO**

**$1200**
**on easy payments**



## The Biggest Truck Value in the World

because of its mechanical excellence, reliability, and price. This new ¾-ton INDIANA TRUCK, the latest addition to our line, has in it the same simplicity of design and construction, and reliability of service that has characterized our other vehicles. Only the highest quality materials and workmanship go into INDIANA TRUCKS.

At $1200, on easy time payments, this truck will quickly pay for itself. Bring your delivery system up to the highest possible efficiency by installing a ¾-ton INDIANA as part of your service.

*Circular on request*

**Harwood-Barley Manufacturing Co.**
**MARION, INDIANA**

INDIANA

## COTTA TRANSMISSION

## Years of Experience

—in the manufacture of Motor Vehicle Transmissions, coupled with the best ideas of foremost engineers, are united to make COTTA the standard transmission.

Now in use by well-known truck manufacturers as standard equipment.

Special COTTA devices, insuring long life and safety, establish it as a leader.

Insist on COTTA Transmission in your next machine, for economy.

**Cotta Transmission Company**
814-18 S. Main St., Rockford, Ill.

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# Eliminate Doubt

**make assurance doubly sure**

**There is a real reason why**

**LAVINE Steering Gears**

**are recognized as America's standard**

More than any other part of the truck equipment, the steering gear needs to be reliable. Neglect in this respect may very easily lead to serious trouble. LAVINE Gears will set your mind at rest.

**The answer lies in the fact itself**

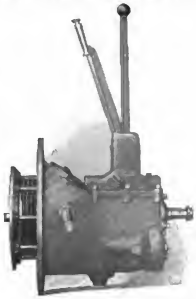
Four sizes—½-ton to 5 tons. Send for blue prints.

**LAVINE GEAR COMPANY**
**Station A** **RACINE, WIS.**

# FULLER
## Unit TRANSMISSIONS

Model "T U" ¾-1 Ton

Model "T U 2" 1½-2 Ton



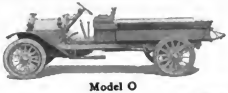
*Particulars sent on request*

**FULLER & SONS MFG. CO.**
**Kalamazoo, Mich.**

# UNIVERSALLY POPULAR AND LASTINGLY GOOD

Sanford Trucks are QUALITY TRUCKS, combining the best of material, with engineering excellence and mechanical precision.

That is why they are representative of high efficiency and economy of operation; consequently, universally popular because they are built LASTINGLY GOOD.



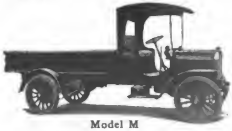
**Model O**

**Model O ¾ Ton $1350 Express**

**$1290 Chassis**

**Model M 4000 lbs. Capacity $2000 Express**

**$1910 Chassis**



**Model M**

Dealers are at liberty to send for Sales Plan and inquire for open territory.

**Sanford Motor Truck Company**
**Syracuse, N. Y.**

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The Knox TRACTOR

## For Municipal and County Paving and Road Building

For the hauling of all kinds of road-building material—crushed rock, sand, gravel, concrete, paving blocks, etc.—the Knox Tractor with one or more trailers makes a combination which cannot be surpassed for tonnage capacity and low ton mile cost.

In a Knox Tractor you have a detachable, interchangeable power plant which can be kept on the job all the time. No waiting while there is loading or unloading to be done.

Any type of trailer may be used—rear or bottom dump, long or short bed, low or high body. **The Knox Tractor hauls them all.**

Our Booklet A explains why the tractor and trailer method is the only real solution of heavy hauling. Write for your copy today.

**KNOX MOTORS ASSOCIATES**
**SPRINGFIELD, MASS.**

New York 1872 Broadway | Boston 825 Tremont Bldg. | Chicago 1621 Michigan Ave. | Philadelphia 604 Abbott Bldg. | Kansas City 1735 McGee Street

# DOES THIS INTEREST YOU?

Suppose you could get a hauling job at 66 2-3 cents per ton, over a haul of reasonable length, on the best types of streets in your city. Would that interest you? Well, in your city, there is a lot of this sort of freight to be hauled. It is self-loading and unloading. It is a live load, and it is a clean load. It is a load that you can carry both directions. You are paid in advance for hauling it. There are no seasons in this kind of business, for the load must be carried every working day in the year, and on Sundays and holidays it is greater than on week-days.

You have probably guessed by this time the kind of load we mean: **passengers.** The average passenger weighs 150 pounds—thirteen and one-third passengers to the ton, at 5 cents apiece; total, 66 2-3 cents per ton.

The illustration shows two jitney buses in use in Baltimore, Md., hauling this highly-paid class of freight. They are mounted on 1-ton Bessemer chassis, with an economical type of all-weather bus body. Write us, and we will tell you why O. L. Wright bought Bessemers, and how much it will cost you to buy some like them.

They are made in all styles and capacities, of course—to fit your particular local requirements. Is there any other class of trucking that will pay as high rates as this, open to you?

**BESSEMER MOTOR TRUCK COMPANY ∴ Grove City, Pa.**




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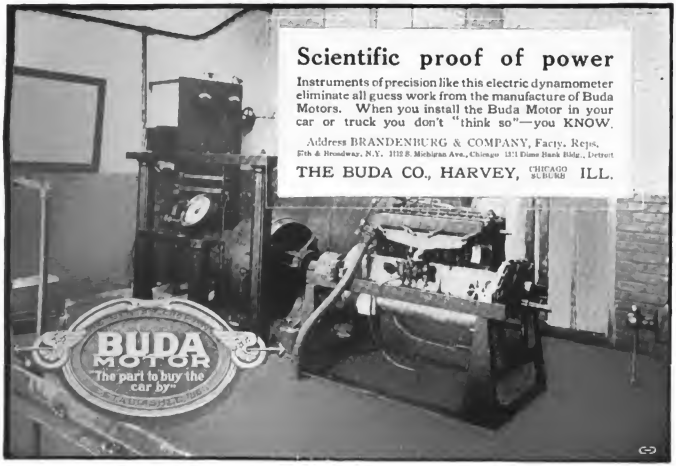
Scientific proof of power
Instruments of precision like this electric dynamometer eliminate all guess work from the manufacture of Buda Motors. When you install the Buda Motor in your car or truck you don't "think so"—you KNOW.
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5th & Broadway, N.Y. 1112 S. Michigan Ave., Chicago 1311 Dime Bank Bldg., Detroit
THE BUDA CO., HARVEY, CHICAGO SUBURB ILL.
BUDA MOTOR
"The part to buy the car by"

# Mileages Doubled! —by GOODRICH "DE LUXE" WIRELESS TRUCK TIRES

**Ask users!**

**Typical Records on Goodrich "De Luxe"**

(Note—These records are being made under abnormal operating conditions)

"8,511 miles to date. Not yet worn to height of S. A. E. standard tires when new. Streets beggar description."

"10,000 miles—still in first-class condition."

"8,700 miles—in excellent condition."

"Have used all makes. 'De Luxe' giving 100% more mileage than ever received from any other make."

"Will exceed 10,000 miles—severe operating conditions."

"4,729 miles—expect 7,000 to 10,000 more."

"10,000 miles—steep hills—bad paving—5-ton truck."

**Names and full particulars on request**

## Truck users!

Are you forced to operate trucks

—over bad pavements? —with heavy loads?
—up and down steep grades? —under other severe conditions?

Benefit by the experiences of truck users everywhere. See typical records cited. Get double—even triple and more mileage!—as they do.
Equip with the "De Luxe" Type Goodrich Wireless Truck Tires.

## Compare these Cross Sections!

NOTE—

(1) The higher tread in the "De Luxe" Wireless. More rubber—and placed on top where the wear comes—not on the sides.

(2) The added cushion afforded load and truck mechanism more resiliency—less repair expense—more "life" or endurance thus given to the rubber itself by this extra factor of safety.

(3) The "Duplex" Curve shape prevents bulging out at sides under load—reduces chipping.

The Goodrich "De Luxe" Wireless—for severe operating conditions—is the Most Successful Mileage Giving Tire Ever Produced. Facts Proved—Ask any User!

"Upsetting Mileage Tradition"—the booklet that fully describes "De Luxe" tires and gives actual performance records—is ready for you! Write

**The B. F. Goodrich Company**

The world's largest rubber factory Akron, Ohio

Service Stations and Branches in All Principal Cities



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B. A. Gramm's consistent development in the Motor Truck field during the past 14 years gives you in this line of chassis, from 1 ton to 6 tons, the greatest ever produced. The only trucks in the world with fool-proof clutch and transmission. The wonderful increase in our production has come direct from repeat orders.

Your customers want the best at the lowest price. We have the greatest truck selling proposition on earth.

***Write Quick—This Chance for 30 Days Only***

**The Gramm-Bernstein Co. Lima, O., U.S.A.**

ANNOUNCEMENT

OWING TO THE RAPIDLY INCREASED DEMAND FOR TORBENSEN INTERNAL GEAR AXLES, OUR NEWARK PLANT HAS BECOME INADEQUATE, AND WE HAVE SECURED A FACTORY AT CLEVELAND, OHIO, WITH FIVE TIMES OUR PRESENT CAPACITY WHERE WE SHALL BE LOCATED AFTER JUNE 15TH, 1915.

WE SHALL MANUFACTURE AT CLEVELAND A COMPLETE LINE OF SIZES OF FRONT AND REAR TRUCK AXLES.

THE UNDERSIGNED WILL HAVE THE MAIN OFFICE AT CLEVELAND, WHERE WE SHALL BE PLEASED TO WELCOME OUR CUSTOMERS AND FRIENDS, AND WHERE ALSO WE SHALL BE SO SITUATED THAT WE CAN MAKE MORE FREQUENT PERSONAL CALLS UPON THE TRUCK MANUFACTURERS.

OUR ADDRESS WILL BE:

EAST 72ND ST. & L. S. & M. S. R. R.

CLEVELAND, OHIO

TORBENSEN GEAR & AXLE COMPANY

V. V. TORBENSEN, PRESIDENT
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## Sensitive Control, Closely Following the Road Conditions

as the truck encounters good roads and bad, up hill and down—every possible influence of surface and grade—leaving nothing for the driver to do but steer.

# The Krebs

# Automatically Governed Worm Driven

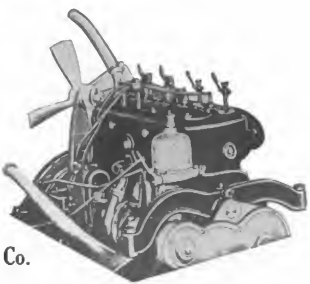
# Truck

In this modern truck the driver's work is simplified and reduced to the legitimate work of the vehicle driver: watching the traffic.

The control of the motor is taken care of by the KREBS Governor, an automatic device which operates like the unerring hand of an expert, maintaining the schedule under the changing conditions of the trip and at the same time economizing gas and saving the truck and tires. This device is not a mere speed-limit, but actually **governs** the entire handling of the motor. It sensitively and immediately corrects the spark advance and opens or closes the throttle, by gradual degrees, to meet the road conditions as they change from moment to moment.

The KREBS Truck is also equipped with worm drive, admittedly the most efficient, silent and serviceable method. Our worm drive is properly constructed and mounted, and is the identical form successfully employed in Europe for years. Other meritorious features are the location of the radiator behind the motor, Continental motor (equipped with the Automatic Governor), center control, left hand steer, full floating rear axle, bodies to fit all trades and industries.

We have been building motor cars and trucks since 1899 and this KREBS truck is by all odds the best commercial vehicle we have ever brought out.



**The Krebs Commercial Car Co.**

CLYDE, OHIO



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# SUPERIOR

## From Top to Bottom—
## From Eye to Lubricating Cup

Two examples of the definite superiorities that distinguish every part of Detroit Springs:

—Near the end of each leaf is a lubricating cup filled with a long-lived lubricant. This spreads between the leaves with every movement of the springs, giving smooth action, long service and silence.

—The "eyes" of Detroit Springs are made with infinite care for accuracy. Heat-treated until toughness and durability is assured. Annealed to remove brittleness. Then reamed precisely to the thousandth part of an inch.

## Guaranteed for Two Years

Detroit Springs are designed, built and tested to meet the specific requirements and the emergency needs of each particular model of truck on which they are to be used. There are no ***stock*** Detroit Springs.

Their strength, hardness, resilience and flexibility have been proved by actual tests before leaving the factory.

# DETROIT SPRINGS

Detroit Springs
SELF-LUBRICATING

In buying a truck always ask "What springs are on this truck?"
Send for the interesting book, "From the Ore to the Motor Car."

**DETROIT STEEL PRODUCTS CO.**
**2260 East Grand Boulevard Detroit, Mich.**




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Outfit owned and operated by John Wanamaker, Inc., New York City, hauling merchandise from main store to sub-stations in Bronx, New York, and Trenton, N. J.

**John Wanamaker, Inc., New York City**
**The Eastman Kodak Co., Rochester, N. Y.**
**The Bissell Carpet Sweeper Co., Grand Rapids, Mich.**
**The Cadillac Motor Car Co., Detroit, Mich.**
**The Studebaker Corporation, Detroit, Mich.**
**The Saxon Motor Car Co., Detroit, Mich.**

We pick these six TROY owners because of the way they bought.

Each of them was skeptical about trailers. The principle was so simple and the saving so big that they thought there must be a flaw somewhere. So they investigated—every one of them. Some investigation, too — thorough, complete, exacting, ***and They Bought TROYS.***

No matter where or what your business is, tell us your hauling problem. We will tell you frankly whether or not you need Trailers. Write for catalog 4 C. V.

# THE TROY WAGON WORKS CO.

**TROY, Miami County, OHIO**

New York, 50 Church St. | Detroit, 319 Hammond Bldg. | St. Paul, 331 First Nat'l Bank Bldg. | Washington, D. C., 505 Riggs Bldg. | London, Eng., 49 Pall Mall

**Troy Trailers**




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# The use of Sheldon products by any manufacturer is a certain indication of a desire to give greatest efficiency to the ultimate consumer. For upon that basis only are Sheldon products manufactured.

# SHELDON

Cost in the Sheldon Organization is a secondary consideration.

First, in the design, and then, in the production, but one question is ever considered.

Will this design, will this method, give to the ultimate consumer the most that he can possibly obtain for his expenditure?

And when that superior design has been proved—and when that superior method of production has been learned, on that design and along that correct method only is the finished article produced.

After this, then, the cost.

That is why, in the science and art of Spring making, the name Sheldon always has stood as a standard by which to measure Spring performance.

That is why Sheldon springs last longer and ride easier—why manufacturers who seek to give their customers the greatest value put their spring problems up to the Sheldon organization.

The truth of this somewhat idealistic condition is shown conclusively in the design and manufacture of Sheldon Worm Gear Axles. Here popular prejudice and blind following of antiquated ideas were discarded in the light of superior developments that at the time of their adoption seemed revolutionary. We learned from actual exhaustive tests and demonstrations that semi-floating construction alone assured the most serviceable axle. So in face of prejudice we have hung to this principle, till today its correctness has been firmly established.

We knew that ball bearings alone could stand the terrific worm strains, so in spite of popular prejudice in this country, in favor of other construction, we insisted upon using ball bearings. And here, too, we have proved our contentions to be correct.

That we have been correct in assuming that the buying public is keen enough to appreciate such honest efforts to supply it only with the ultimate best is shown in the fact that today our one problem is that of production—production in sufficient quantity to supply the insistent demand of that wise buying public that will accept no compromise, when the real product is attainable.

## THE SHELDON AXLE & SPRING COMPANY

Makers of Springs and Axles for Heavy Duty Service for More Than 50 Years

WILKES-BARRE — Chicago: 122 S. Michigan Blvd. — Detroit: 1215 Woodward Ave. — San Francisco: 444 Market St. — PENNA.

"Exhibiting Section 16, Transportation Building, Panama-Pacific Exposition, San Francisco"




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SIGNAL

Worm-Drive Trucks

# Simple, Silent and Efficient
## The Signal Line

| | |
|---|---|
| One ton Worm drive chassis | 1500 |
| One and one-half ton Worm drive chassis | 1700 |
| Two ton Worm drive chassis | 2000 |
| Three and one-half ton Worm drive chassis | 3000 |

All prices F. O. B. Detroit

One Ton Worm Drive Used in Department Store Service

## Signal Motor Truck Company

Motor Truck Manufacturers

Detroit, Michigan, U. S. A.

PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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# FEDDERS RADIATORS

FEDDERS Radiators are as good for their purpose in truck practice as the best motors—the finest gears—most effective ignition, etc., are for their functions.

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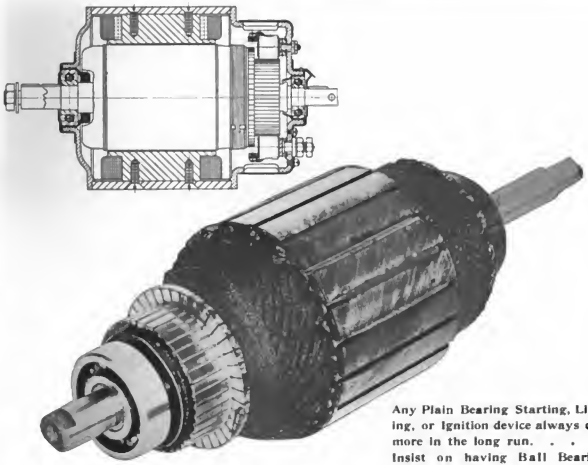

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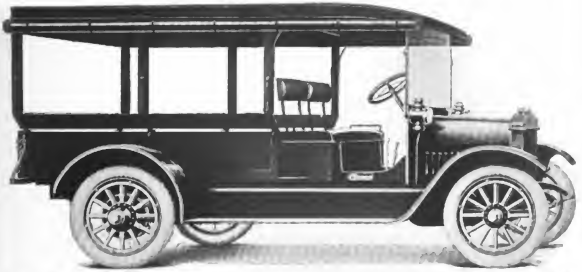

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## TO THE DEALER

Fill in the following, detach and mail to us today. By return mail, you will receive complete information.

Name _____ Address _____

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Do you operate salesroom? _____ Garage? _____

Do you desire dealers' proposition? _____

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**Mark your envelope "Dept. B"**



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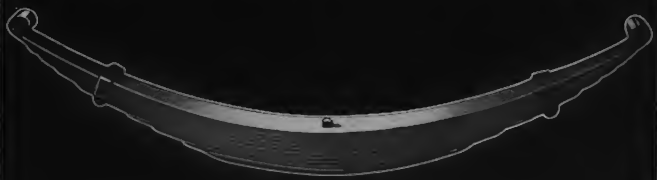

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**The Hess-Bright Mfg. Co.**

**Philadelphia, Pa.**

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*Open Express Delivery Car*

**$750**

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# A Substantial Delivery Car at a Low Price

THIS announces the new Overland Delivery Car—now ready for immediate shipment.

Unusually low in first cost, and inexpensively maintained, this sturdy vehicle will soon *pay for itself in quick deliveries.*

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**High tension magneto ignition**
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**Left-hand drive**
**Center control**
**Electric switches on steering column**
**Magnetic speedometer**

**"Made in U. S. A."**

*Write for a special delivery car catalogue. Please address Dept. 191*

**The Willys-Overland Company, Toledo, Ohio**




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The COMMERCIAL VEHICLE

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Everybody is talking preparedness. It appears that there are only twelve field guns east of the Mississippi, in spite of the European example of the importance of powerful and

## MOBILE ARTILLERY

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## MOTOR BATTERY

is maneuvering. Read about it in this and subsequent issues of

The COMMERCIAL VEHICLE

There is another kind of preparedness which has nothing to do with war.

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You need expert advice on these subjects.

You need suggestions gleaned from the whole field of commercial vehicle use.

You need to know what is the latest in equipment, appliances and methods for the running of your shipping room and rolling stock.

## BE PREPARED

Read every issue of

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239 West Thirty-ninth Street
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## Chassis Price, $1650

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*Established 1897* *MOTOR CAR DELIVERY SPECIALISTS*




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The Commercial Vehicle
Read by Business Men

Vol. XIII August 15, 1915 No. 2

# Four Trucks Save $40,000 by Efficient Loading and Sorting

## Saving Made in 3-year Period by Two Gasoline and Two Electric Trucks of Newark, N. J., Manufacturer—Sales Increase 67 Per Cent

ELIMINATION of horse-pace methods of loading, unloading, routing and internal systems of packing and wrapping have enabled four motor trucks owned by the Central Stamping Co., Newark, N. J., to save between $40,000 and $45,000 in a 3-year period of operation and to increase the sales in the metropolitan district of New York City by more than 67 per cent in the same time. This large saving represents the difference between the cost per unit of work done by the trucks and that by horses, twenty of which were used to make all deliveries before the purchase of the trucks.

### Competition Forced Truck Purchase

The Central Stamping company is located in Newark, N. J., on a bend of the Passaic river approximately 8 miles by road west of the lower end of Manhattan Island. The company has been established in Newark since 1834. It manufactures a complete line of tinware, enamel kitchenware, galvanized ware, and a miscellaneous line of stampings. Previous to April, 1911, it had used horses exclusively to make local deliveries to retail and wholesale dealers in New York City and to the piers along the Hudson and East rivers for export and coastwise shipments.

In the spring of 1911, the company felt the pinch of competition with other concerns which were making deliveries with motor trucks in the metropolitan area at points which it could not reach with horses. At this time the delivery area was restricted within a 5-mile radius from the plant except to the east, where it included Jersey City, Hoboken, Man-

The two 3½-ton G. V. electric trucks used by the Central Stamping Co. to make deliveries of export and coastwise shipments from its Newark, N. J., plant to the piers on the Hudson and East rivers. Note how the vehicles are backed up to the loading platform over a spur track for the use of freight cars for overland shipments

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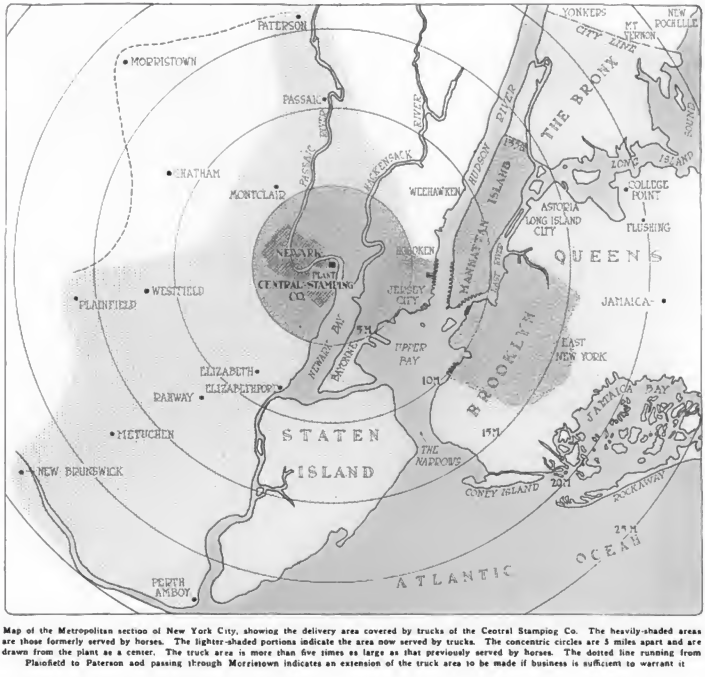


**Map of the Metropolitan section of New York City, showing the delivery area covered by trucks of the Central Stamping Co. The heavily-shaded areas are those formerly served by horses. The lighter-shaded portions indicate the area now served by trucks. The concentric circles are 5 miles apart and are drawn from the plant as a center. The truck area is more than five times as large as that previously served by horses. The dotted line running from Plainfield to Paterson and passing through Morristown indicates an extension of the truck area to be made if business is sufficient to warrant it**

hattan Island as far north as One Hundred Thirty-fifth street and the upper portion of Brooklyn to East New York.

The farthest point of delivery was in East New York, which is approximately 15 miles from the plant. One Hundred Thirty-fifth street, the northern boundary of the delivery area on Manhattan Island, is approximately 12 miles from the plant. The greatest daily mileage of the horse wagons was between 25 and 30. Trips were made to these extreme points several times a week, and when made, the horses were completely tired out when they returned to the plant and had to be used on shorter routes or laid up on the day following.

Although the greater portion of the company's deliveries were made in the lower end of Manhattan Island, the rapid growth of the upper portion of the island, the Bronx, Bay Ridge and Long Island City, opened up large selling territories in which the firm could not deliver direct with horses. Goods sold in these sections had to be expressed at a comparatively high cost and which often took several days. Competing concerns located in the Bronx and in Brooklyn delivered direct to customers in these areas.

### Bought Trucks to Keep Business

The metropolitan sales force secured a large number of orders in the districts which could not be served by horses, so that it was imperative to secure some new means of delivery if the business was to be kept.

The purchase of a 3-ton Packard in April, 1911, was the first step to keep this business. In February of the following year, another Packard of the same capacity was bought. In December of the same year a 3½-ton G. V. electric was purchased to make deliveries of the freight and export shipments to the New York City piers. This truck proved so successful that another of the same make and capacity was bought in December, 1913. A 2-ton Reo was purchased in February of this year, so that the fleet now numbers five, three gasoline and two electric trucks.

In addition, four horses have been retained out of the twenty formerly used. Two of these are used for work around the plant, such as hauling ashes and refuse, and two are used to transport light freight shipments to and from the freight stations in Newark.

The delivery area served by the trucks now includes the entire island of Manhattan and extends as far north as the

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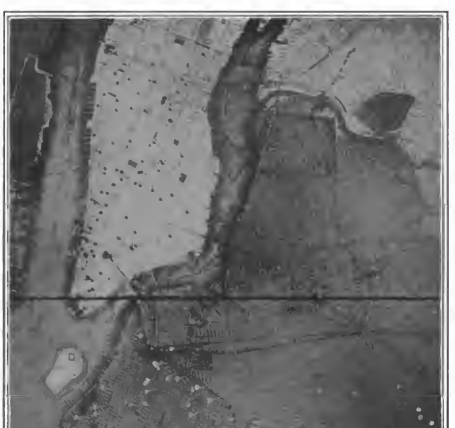
Yonkers city line in New York and as far north as Paterson in New Jersey. It includes all of Brooklyn and Queens as far east and south as College Point, Flushing, Jamaica, Coney Island and Far Rockaway. On the south it takes in Bayonne, all of Staten Island and extends as far as Perth Amboy, including the intermediate towns of New Brunswick, Metuchen, Rahway, Elizabeth and Elizabethport. On the west it extends to Plainfield, Westfield and Montclair. If business warrants it, the route in this direction will be extended to include Chatham and Morristown and intermediate points.



A portion of the large wall map in the general offices of the company with varied colored pins stuck therein indicating the locations of the places of business of the various customers. This map extends from the floor to the ceiling and is made in several sections, the heavy black horizontal line being one of the lines of juncture of two adjacent sections. The customers of each salesman are designated by pins with heads of different color. This map shows graphically the location of each customer and is of great value in laying out the truck routes so that overlapping is eliminated

### Delivery Area Increased Fivefold

This area is more than five times as large as that formerly served with horses but notwithstanding this fact, the average cost of delivery has been reduced from the horse cost of 20 cents per 100 pounds to 16 cents. Another important point in connection with the increased area is that while the horse wagons made only one trip per day except in Newark and vicinity, the trucks make two deliveries per day to all points within a radius of approximately 20 miles from the plant.

Before the first truck was bought in the spring of 1911, the Central Stamping company made extensive tests with both gasoline and electric trucks in 1910. At this time the tests carried out proved that the cost of deliveries could be reduced by their use. This, with the desire of the company to increase its delivery radius in order to meet competition, led to the purchase of the first Packard in 1911.

This truck and the other Packard purchased in the following year were tried out in making deliveries to the piers for freight shipments but did not prove entirely successful for three reasons. First, because gasoline trucks were not allowed on all of the piers and horses had to be used to deliver to the others, often duplicating a portion, if not all, of the truck route. Second, because of the costly delays encountered in waiting to get on the piers due to serious congestion on the street in front. Third, because the cost of the gasoline consumed was excessive due to the fact that the motors of the vehicles had to be kept running while waiting in line. These three conditions led the company to rent electric trucks for the work and to keep accurate records of the cost of operation for use in comparison with the gasoline truck costs.

One of the Packard 3-tonners used to make deliveries to the outlying points in the Metropolitan area. Note the overhang of the body back of the rear axle which is permissible because of the light weight of the material carried

### Electrics Efficient for Pier Work

These trucks made two trips a day to the lower section of Manhattan, averaging a total mileage of 28. The average cost of delivery, according to T. D. Pratt, works engineer of the concern, was 11 cents per 100 pounds, or approximately 9 cents less than the horse cost and 5 cents less than with the gasoline trucks.

This large saving warranted the company in purchasing the two electrics now in use. They are used exclusively for the delivery of packed goods to the piers for export and coastwise shipments. Two trips are made daily to Jersey City and Hoboken and on Manhattan Island as far north as Twenty-third street. The Brooklyn area served by the electrics extends along the East river water front as far south as Fiftieth street.

Although considerable trouble was ex-

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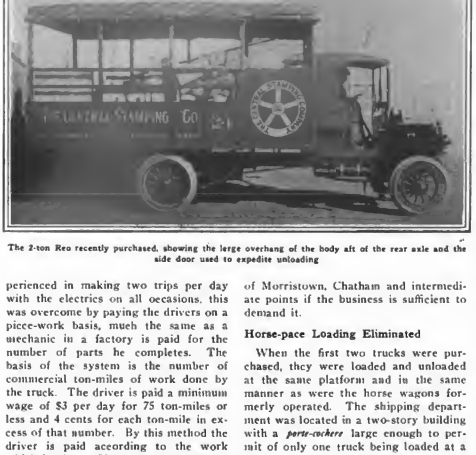



The 2-ton Reo recently purchased, showing the large overhang of the body aft of the rear axle and the side door used to expedite unloading

perienced in making two trips per day with the electrics on all occasions, this was overcome by paying the drivers on a piece-work basis, much the same as a mechanic in a factory is paid for the number of parts he completes. The basis of the system is the number of commercial ton-miles of work done by the truck. The driver is paid a minimum wage of $3 per day for 75 ton-miles or less and 4 cents for each ton-mile in excess of that number. By this method the driver is paid according to the work which he does. If he does not do more than 75 ton-miles of work, he gets only $3, but if he does more, he is paid in exact proportion to the amount done. The ton-mileage is computed by the commercial formula.

### Drivers' Bonus System Produces Results

This system with the opportunity it offers to the drivers to increase their daily wage, has eliminated the habits they had of reporting that they could not make the second trip to the wharves each day. They now take pains to see that they are not delayed through any fault of their own or not held up when there is any possible chance of getting on the piers. The system allows the drivers to make from $4 to $5 per day, according to their ability.

The 2-ton Reo recently purchased makes two trips each day to New York and Brooklyn, going as far north as Fifty-ninth street in Manhattan and as far east in Brooklyn as East New York.

The two 3-ton Packards are used to serve the outlying districts, making trips to the upper portion of Manhattan, the Bronx, Staten Island, points in Queens and points in New Jersey as far south as Perth Amboy and as far west as Plainfield. One trip is made daily by these trucks, the Bronx and New Jersey points being served once or twice a week as the volume of business demands. One of the trucks will also take in the towns of Morristown, Chatham and intermediate points if the business is sufficient to demand it.

### Horse-pace Loading Eliminated

When the first two trucks were purchased, they were loaded and unloaded at the same platform and in the same manner as were the horse wagons formerly operated. The shipping department was located in a two-story building with a *porte-cochere* large enough to permit of only one truck being loaded at a time.

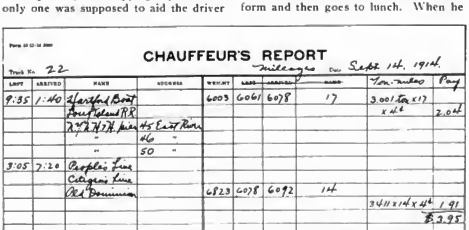
Beside the fact that only one truck could load at a time, the internal system by which the packed goods were brought to the tailboard of the truck for loading was very poor. Notwithstanding that there were no less than thirty-six men in the packing and shipping departments, only one was supposed to aid the driver to load his vehicle. Often it took from 2 to 3 hours to load. This was a horse-pace method. The company realized that if the trucks were to pay, this condition of affairs had to be remedied at once.

### Packing System Changed

The first step taken was to enlarge the *porte-cochere* to double its former size so that both of the trucks could be loaded at the same time. The next was to change the internal system so that the idle loading time could be reduced. This was accomplished by detailing six of the men in the packing department to aid in loading the truck as soon as it arrived at the loading door. In the morning when both of the trucks are to be loaded at the same time, twelve men are used and more if necessary. The loading of the trucks is given precedence over the packing operations. The foreman of the department had this drilled into him. He drilled it into the men working under him. Every idle minute of the trucks' time cost money, they were told, and this time could not be made up. The trucks are now loaded in 10 to 15 minutes.

### Lunch Period Utilized for Loading.

Another change which has practically eliminated the loading time of the trucks on their second trips of the day has been accomplished by having the drivers call the New York office on the telephone when they have delivered their loads and are starting for the factory in Newark. The New York office in turn notifies the factory over a privately-leased wire. This enables the shipping department at the plant to have the second load on the platform when the truck arrives. The driver backs his truck up to the platform and then goes to lunch. When he



Form 10-12-14 2000

CHAUFFEUR'S REPORT

Mileage Dec. Sept 14th. 1914.

Truck No. 22

| LEFT | ARRIVED | NAME | ADDRESS | WEIGHT | LAST | MIDDLE | NAME | Ton-miles | Pay |
|---|---|---|---|---|---|---|---|---|---|
| 9:35 | 1:40 | Hartford Boat | | 6003 | 6061 | 6078 | 17 | 3.001 Ton x 17 x 4¢ | 2.04 |
| | | Fall River RR | | | | | | | |
| | | Nat'l Dist. Co. | 45 East River | | | | | | |
| | | " | 46 " | | | | | | |
| | | " | 50 " | | | | | | |
| 3:05 | 2:20 | Cooper's Line | | | | | | | |
| | | Colgate's Line | | | | | | | |
| | | Old Dominion | | 6823 | 6078 | 6092 | 14 | | |
| | | | | | | | | 3.411 x 14 x 4¢ | 1.91 |
| | | | | | | | | | $3.95 |
| | | | | | | | 31 | | |

Odometer 6092 Mileage To-Day 31

Gasoline Gals —— Oil Quarts ——

R. J. Cairnsky

Filled-out report of one of the drivers of the electric trucks, showing daily mileage; tonnage delivered; calculations for the determination of ton-mileage and the driver's pay figured out at the rate of 4 cents per ton-mile. Note that the driver's daily wage in this particular case is $3.95, the regular day's pay being but $3. The 95 cents is a bonus. By this method the driver is paid in direct proportion to the amount of work he accomplishes

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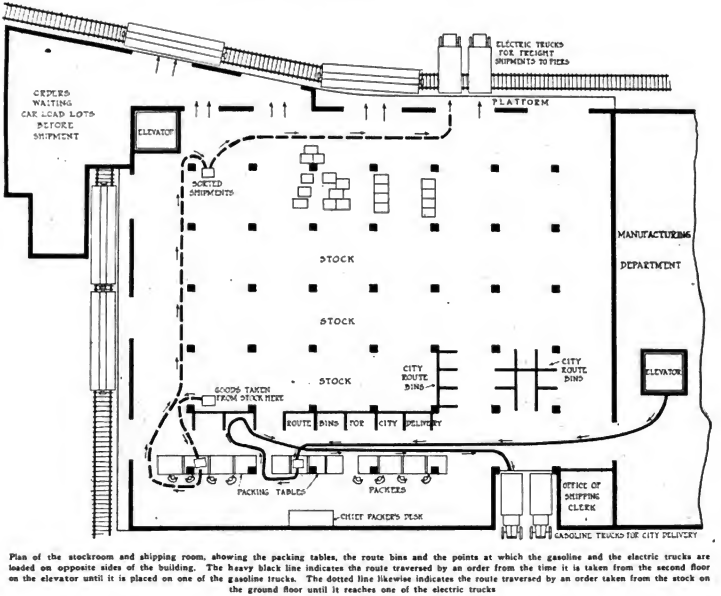


**Plan of the stockroom and shipping room, showing the packing tables, the route bins and the points at which the gasoline and the electric trucks are loaded on opposite sides of the building. The heavy black line indicates the route traversed by an order from the time it is taken from the second floor on the elevator until it is placed on one of the gasoline trucks. The dotted line likewise indicates the route traversed by an order taken from the stock on the ground floor until it reaches one of the electric trucks**

returns, his vehicle is completely loaded and he begins his second trip at once.

The result of these three simple changes, which, while not made when horses were used exclusively because the time and money lost did not appear to be great, changed the operation of the trucks from a possible failure to a certain success.

With this speeding up of the truck loading, it became necessary to make changes in the method of packing the goods, so that the greater number of men used in loading did not decrease the amount of goods which could be packed and made ready for shipment in a day.

The packing and shipping departments are located in a two-story building also used as a stockroom. The center of the building is given over to the stock and the sides and one end to space for packing the goods for city delivery and boxing those for export shipment, and for the storage of both classes until ready for loading. Above the space used for the packing operations there is a mezzanine floor suspended from the roof and which is used for the storage of miscellaneous stock.

The material stored on the upper and mezzanine floors is taken down to the main floor on elevators, one at each end of the building, and then trucked by hand to the spaces in which it is packed or boxed. The goods stored in the center of the main floor are also trucked to the packing space in the same manner.

### Changes Made in Packing System

Before the purchase of the trucks, the goods making up each order were collected from the different stocks by men with conventional hand trucks and deposited at any point of the space given over to the packing and boxing operations which did not happen to be in use. Imagine thirty-six men, each with a loaded hand truck coming from each of the four corners and center of the building to deposit portions of the same or different orders in the packing space, and you will have an idea of the resultant confusion and the answer to the reason why the trucks sometimes took 2 hours to be loaded.

That method was slow and costly and the confusion of the men going in all directions consumed so much time that none of the men could be used for loading the trucks without less packing being done. The imperative demand for the reduction of the loading time of the trucks made a change in this system necessary. The change made consisted of the use of a low, narrow table along one side of the building with a space between it and the side wall of the building of approximately 15 feet. This space is used for wrapping and boxing the goods. on the other side of the table is a 5-foot aisle and beyond that a row of bins opening on the aisle, into which the goods are placed according to their destination after being packed.

### Lay-out of Packing Floor

The table is divided into several parts with a narrow aisle between each to permit of the passage of men with hand trucks from the packing side of the

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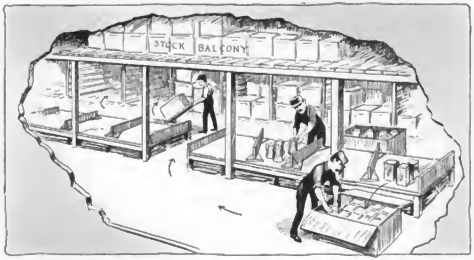
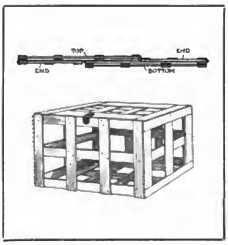



View of a portion of the shipping department, showing the packing tables with the movable division boards thereon. Note the paper packing cartons stored on the floor under the tables. The man in the aisle to the rear of the table has brought an order to the table; the one on the near side is packing it in a paper carton, after which it will be trucked to one of the route bins on the aisle. The arrows indicate the route traversed by the order from the time it reaches the table until it is put in the route bin to await the arrival of the truck

table to the pins with the orders ready for shipment. The men bringing the goods from the various parts of the floor to the table do not go in back of it in the packing space, but move down the aisle in front until they find empty spaces thereon. Here they deposit their loads and return to various parts of the stock floor for goods of different character, according to the make-up of the order. Each order on the table is separated from the one next it by means of narrow boards set up on end with braces and which may be moved along according to the space taken up by each order. As soon as each complete order is placed on the table ready for packing, the man making it up gives his order slip to one of the packers, who checks up the goods with the order, and if O. K., wraps them in paper cartons if for city delivery or places them in boxes for export shipment. As soon as the orders are packed, they are transferred to the various route




The type of collapsible wood crates used for small orders. The sketch at the top shows the crate in its collapsed form with sides and ends folded flat with top and bottom, and beneath, the crate in its normal state. These crates are left with the goods when delivered and are picked up on the next trip of the truck. As they take up very little room when folded, other goods may be picked up on their return trips to the plant

bins by men who do nothing else. They remain there until the truck arrives, when they are trucked to the *porte-cochere* and lifted onto the tailboard. This lifting is necessary because the floor is flush with the roadway outside.

Only the gasoline trucks are loaded in the *porte-cochere*, the electrics being loaded from a platform on the opposite side of the building. Along the front of this platform is a spur track. Freight cars are spotted on this track for shipments to various parts of the United States. Spaces are left between the cars to permit the trucks to back up to the platform, the space between the rails being filled in with gravel, as shown in the illustration on the first page of this article.

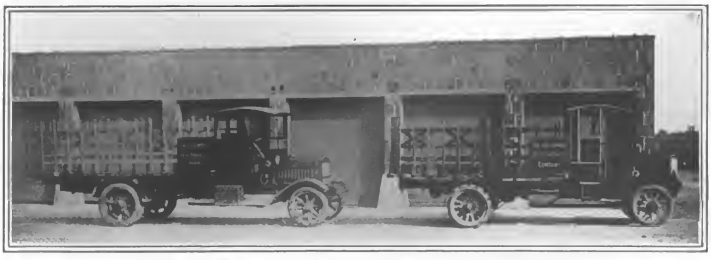
These goods, nevertheless, are all packed at the packing table with the city deliveries and are then trucked across the building and stored in bins on this side of the building until loaded.

A plan view of the building, showing the space reserved for stock and the packing table is shown on page 9.

### Reasons for $40,000 to $45,000 Saving

The cost of installing the packing table was very small. Yet it reduced the space formerly used for packing by 33 per cent and eliminated sixteen of the thirty-six men formerly employed, so that twenty men now do all the work, including the loading of the trucks in an eighth to a tenth of the time formerly required.

These simple changes in the internal system enabled the trucks to be loaded quickly; it enabled them to spend the greater part of their time on the road actually delivering goods; it enabled them to make use of their great ground-covering ability as compared with horses, and finally it enabled them to save the Central Stamping company the large sum of between $40,000 and $45,000 in the 3-year period in which four of them have been operated. It changed truck failure to truck success.



6-ton Smith and 3-ton Packard of Laclede-Christy Clay Products Co., St. Louis, and their garage

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The 5-ton Pierce-Arrow owned by the Billings & Spencer Co., Hartford, Conn., and used for the haulage of heavy material from the railroad station to the plant

# Trucks Well Applied Prove Profitable

### ST. LOUISANS USE VEHICLES WHERE HORSES FAIL

BECAUSE trucks are used only where trucks pay, the three owned by the Laclede-Christy Clay Products Co., St. Louis, Mo., are an unqualified success. This concern has not replaced horses with trucks, but it has applied trucks to work in which horses would not only be inefficient, but wholly impotent.

The business is the manufacture and sale of fire brick, sewer pipe and fireproofing material, and the plant is located about 4½ miles west of the center of the city. The material is delivered principally to buildings in course of construction. The concern is not without competition and the choice of the contractors, between this firm and its competitors is usually on a basis of delivery. The utmost radius of delivery with horses is from 5 to 6 miles from the plant, while the trade extends over an area 8 to 10 miles out from the plant. To make satisfactory delivery in the outer portions of this territory, which embraces much of the new sections of the city where building operations are most active, without trucks, required the shipment of the material by freight, which of course involved delay.

To beat the railroad meant to make better delivery, and so the Laclede-Christy company applied three trucks, a 1½-ton and a 3-ton Packard, purchased in 1910, and a 6-ton Smith, bought in 1912. These trucks make three trips per day to districts to which horses could make but one. In the killing heat of a St. Louis summer this would mean a severe tax upon the horses, some of the trips being 20 miles all told, and would make quick delivery impossible. On the average, the trucks make three trips per day of a total of 8 miles each, or about 25 miles per day. The horses make two trips per day, averaging 10 miles per day. The concern has four horse wagons which it operates with two-horse teams.

The roads and streets, especially where the building operations are going on are usually very poor.

According to Mr. Schewe, in charge of the teaming and trucking, the cost of the trucks is not higher than that of the horses for the same work, and trucks are cheaper than hired teaming contractors on the longer hauls, with the added and and more important advantage, that the service rendered is superior. Each truck has displaced about three teams. He sees to it that no truck is overloaded. All goods are shipped by weight and drivers have strict instructions not to exceed the capacity of their vehicles. The trucks are routed according to the weight of the loads, and according to the speed desired, preference being given to the horses for slow short hauls, and to the trucks where time is valuable.

# Nutmeg Truck Moves Freight Cars

### HAULS PRESSES FROM FACTORY TO FREIGHT STATION

ONE of the most interesting heavy car services in Hartford, Conn., is that of the Billings & Spencer Co., in which a 5-ton worm-driven Pierce-Arrow is used for general trucking. The present plant of the company is some distance from the nearest freight terminal. Mammoth cast iron bases for the heavy drop presses manufactured by the Billings & Spencer company are shipped to Hartford by rail and are transported from the freight yards to the factory by the Pierce. In the accompanying illustrations the truck is shown loaded with a 6-ton base. The finished machines are conveyed from the factory to the freight yards by the truck.

The vehicle is used also about the city to a great extent. About 40 miles is the general day's average as to travel.

Recently the driver of the truck on reaching the freight yards located the car of bases some distance from the overhead crane which is provided by the railroad company for loading and unloading. The driver hitched a chain to the freight car and towed it to the desired position. A few days after the driver shunted a string of freight cars in order to reach the car he wanted. The Pierce is quite a rival of the steam locomotive in moving the cars about.

#### Efficient Loading Methods

Loading and unloading at the factory is easily and quickly accomplished by means of a 20-ton Niles overhead traveling crane. A special loading platform has been built within the erecting department which is sufficiently long to accommodate the truck and permit the large doors being closed in stormy or cold weather.

Another view of the Billings & Spencer Pierce-Arrow 5-tonner loaded with a heavy cast iron base for one of the presses made by that company

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# The British Lorry *vs.* The American Truck

THAT the British motor truck industry has at last recognized that the American invasion of the British Isles is today a reality is adequately demonstrated by the pointed discussions in the business and daily press of England. Much of this discussion is decidedly unfair to the American situation, some of it is highly complimentary, but unfortunately there is a vast curtain of ignorance surrounding the views of many Britishers, who are endeavoring to mould public opinion on the other side of the Atlantic. This ignorance is bound not to put matters in a fair light and it is highly probable that the American product will suffer because of this, if individual makers in this country do not take advantage of the opportunity to set matters right.

Britishers are attacking the American invasion from two cardinal points: First, much capital is being made out of the argument that few of the American makers are really serious in the invasion, but look upon the present year or so as opportune moments to land a number of their trucks in Great Britain, without having to build up a permanent service system, a part of which consists of a good stock of parts so that none of the trucks in operation in those lands are held up for lack of spares.

This is a most legitimate stand to take. It is the same attitude that our good makers have taken in regard to truck distribution in this country. So far as war orders are concerned this matter is being adequately handled, and plenty of spares are being shipped with each consignment. It is but natural to expect that when war days cease most of these makers will continue catering to the market already opened. Several of our leading factories are already caring for such exigencies.

### Americans Mean Business

It is but human to assume that of the forty or more different American truck concerns at present participating in the much-discussed invasion, all are not going to continue after the war ceases. This happens in all industries; but, on the other hand, perhaps a majority of makers are just as desirous of maintaining permanent selling connections in England as in any other country, and their domestic experience in truck merchandising will tell them what service is imperative in the foreign trade.

The second center of attack by a portion of the British trade is on the status of the American industry, which attacks are generally so grossly wrong as to arouse pity rather than resentment. When a so-called leading merchandiser in the British truck trade declares that "With the exception of a few concerns in the United States the heavy-vehicle truck trade is in the hands of speculators, who lack the pride and craftsmanship . . ." the case is really one for pity, as any well-informed British merchant knows otherwise. There are too many Britishers traveling the circuit of American truck and passenger car factories to let such criticism pass with current value; yet it is imperative on the American truck industry to set right such mischievous rumors.

### Nothing to Be Ashamed Of

America has nothing to fear from the truth concerning its motor truck industry. True, it is not all an unblotted sheet; true, some apologies may be needed for certain war goods that have crossed the Atlantic; exceptions occur in any industry, but the brawn and sinew of the American truck industry will stand the analysis of the Britisher well.

Many other misconceptions concerning the American motor truck industry are rampant in England. The question of the assembled truck has unfortunately been badly presented. Britishers have never understood the art and science of assembly manufacture in either the passenger car or motor truck field, but today some of her best merchants are awakening to such possibilities and are visiting the leading American makers of components with the object of purchasing such for assembly on the other side.

While decrying the American assembled motor truck the British dealer clamors for the assembled American motor car. The Britisher has apparently at last realized that it is possible to make the best assembled car, cars that run, that endure, that give satisfaction and sell. Soon this same Britisher will realize that what is possible in the passenger car field is also possible in the motor truck field.

Our amusement is aroused when we read that these same Britishers are agitated over the fact that some of the same units used in passenger cars are used in motor trucks. This is so in the case of motors, the

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# You'll Not Catch Him Napping

PREPAREDNESS AND CO-OPERATION are two words that give the clue to the success achieved by the delivery superintendent of the first department store in Los Angeles to adopt electric trucks; the first to have all-motor delivery; and the first to have a full equipment of modern shipping-room appliances to speed up sorting and loading of packages.

He looks like the right kind of a college president, this delivery expert, and he thinks a good deal like one, too. In appearance and action he shows the powers of an executive who is an investigator, searching out priciples, recording the things that count and no more, educating and guiding his men, with a mind that is not ruffled by troubles.

When he took hold of the delivery of the Broadway Department Store it had fifty head of horses, gradually increasing to sixty-five. The city was expanding in area, and its population increasing very fast. When he began, the city of Los Angeles was 25 miles long and 10 miles wide. Now it is 44 miles long and 39 miles wide. The human side of his job worried him; he could not give a service that was up to the desired standard. They started with one motor truck in 1911 and through his study and insistence gradually came to complete motor delivery. "When I laid off that last big bunch of horses, I went home and slept that night, and I haven't worried about my job since," he says.

He knows what a truck will do, and one of the best things it will do for a store is to take care of expanding trade. In the old days, opening up six blocks of new territory might mean that he would have to sit up nights revising his whole delivery system. A horse can only go his 25 miles. Now a truck simply adds the 6 blocks on the end of the route it has. Long routes do not mean the emotional strain they did when some man telephoned in that his animal had gone lame. They do not mean that a lame animal has got to be pushed over the road, or a customer disappointed. Now if a man telephones that a piston is broken, the superintendent telephones to a man to jump on his motorcycle and take out a new piston. He is there in 20 minutes, and the truck is moving in an hour at a cost of a few cents. And the manager is busy with his own work while it is being done.

The delivery department makes promises on deliveries now anywhere within 50 miles of the store. Floor managers are promised deliveries within 5 to 45 minutes, according to location, and not one time in a thousand does the driver get outside the margin.

When the first truck was put in the superintendent had never had any mechanical experience. His work had been altogether with horses. He says that no man need be afraid to tackle the mechanical problems, but he must tackle them hard. A delivery superintendent must know very nearly what any mechanical part or work on a truck is worth, and he must absolutely know how work should best be done.

He fought with his garage man over the condition of a carbureter until he had remedied a condition he knew was wrong, saving the store 50 gallons of gasoline a month. He knows his loads and his routes, the relative amount of level and hilly, smooth or rough surface travel, exercises his judgment, based on accurate records, and knows what the difference in fuel and oil ought to be and makes the garage come to it.

Delivery economy is his job. He says a man can buy work over the telephone, but he has to be right on the job to buy economy. One of the early electrics had an immense body, too heavy for regular delivery work. He wanted this body shifted to an Autocar, where it would serve for special work, and an open body put on the electric. The body builder's foreman said it could not be done, but with a few chalk lines he showed him just how it could, and saved the store $250 for a new body.

If a part gives out it comes to his desk, and he knows what is the matter with it. He is a hard man to sell goods to, but one of the most accessible to salesmen there is. He requires absolute proof of the merit of the goods. It is one of his principles to give a salesman a hearing, and he will put any amount of time and effort into a trial test if investigation shows that the new item has a chance. And he gives the salesman a fair show.

Reading about the work done by electrics in the east was what started him investigating them. He continued investigating, and although the management was reluctant to buy them, it had enough confidence in his judgment to back it with the price of the trucks he wanted. And he has done some great work with them in city delivery. Last December one electric, with driver and boy helper, delivered 4,400 packages in 25 working days, making 1,400 miles. In the holidays he figures that an electric will give him 250 stops in 60 miles, with a man and boy working 14 hours. And these figures are based upon records.

In his suburban work, running up into big daily mileages, with stops widely spread, of course he uses gasoline trucks. He has gotten from a 1½-ton Autocar with three men in 12 hours, delivery of 396 packages at 349 stops, covering 124 miles. In the holiday period last year he delivered 10,000 more stops than the year before without hiring an outside special or delivery wagon, or paying for an outside special. All he did was put on nine extra helpers; and of course the regular men worked overtime. And it is a fact that during this period the office of the delivery manager was as calm and quiet as one of the old missions on *El Camino Real.*

Pleasant words and soft tones are what bring results. He won't have a man working on deliveries who drinks or is profane. He likes to see the boys have plenty of fun, but there is a certain standard he requires of the men who go out among the store's customers. The foundation of his force is careful selection of men, and sure

(Continued on page 19)

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# Buses Scare Pacific Electric Lines

## Want Relief From Competition of California Stages

SAN FRANCISCO, August 4—Rapid development of interurban bus transportation, using a vehicle of large size and superior comfort, in the state of California is attracting the attention of both steam and electric railway officials as it never has before. In cases like Kirk Phillips's line from San Bernardino over the famous hundred mile Crest Line scenic route through the mountains to Big Bear Lake, the Yosemite bus lines, and those running into Sequoia National Park, it is recognized that they are great builders of railway traffic.

On the other hand, some of the new lines recently put in operation are paralleling the steam or electric lines, or cutting across direct where the rails take a V-shaped route, and the railways feel their competition.

The latest move in the efforts of the railways to curb the bus development is an application filed August 3 by the United Railroads of San Francisco with the State Railroad Commission, asking it to assume jurisdiction over the Peninsula Rapid Transit Co.

The complaint brings up directly the point of whether public necessity and convenience require the operation of the bus service. The electric railway avers that it serves the same territory under franchises and with equipment that cost several hundred thousand dollars, and that the motor bus service is not needed.

A similar application asking the commission to assume or define its jurisdiction over interurban bus lines in general, filed by the Western Association of Short Line Railroads, is now before the Railroad Commission for hearing.

### BUSES TO THE BEACH

NEW YORK CITY, August 6—A new motor bus line has been organized to operate between the shore and winter resorts on western Long Island, N. Y. This concern, the Far Rockaway Transportation Co., Inc., has purchased three Saurer thirty-two-passenger buses and will run these on a 20-minute headway between Far Rockaway, Rockaway Beach and Rockaway Park, a 4-mile run along the ocean.

It has secured a franchise and plans to extend its service to other nearby points and to install a fleet of modern buses to run on regular schedule.

### TRUCK OUSTS MAIL CARS

BOSTON, MASS., August 7—Motor trucks have been substituted for trolley cars in the handling of mail between the general post office and sub-stations in the Boston postal district. A corporation known as the Boston Mail Delivery Co. has been organized with a capital of $50,000 to carry out a 2-year contract with the government, beginning August 15.

There are fifteen 3,000-pound trucks, all G. V.'s, being of a pattern similar to the sixty-eight electric trucks which handle mail in New York City.

The runs into the Boston suburbs vary from 15 to 24 miles in length, with numerous stops at the various sub-stations. The trucks will be garaged and cared for at the Boston Edison Co.'s electric garage on Atlantic avenue.

### INSURANCE RATES CUT

NEWARK, N. J., August 10—A reduction of what would amount to 50 per cent in some cases in motor vehicle insurance has been announced by the New Jersey Fidelity & Plate Glass Insurance Co., which recently added motor vehicle risks to its other enterprises. The reduction is mainly in liability insurance, property damage rates being about the same as that of the conference companies. The New Jersey Fidelity & Plate Glass company has applied to New York State for permission to write motor vehicle insurance there.

### AGAINST STREET SPRINKLING

NEW YORK CITY, August 7—The Citizens' Street Traffic Committee and John T. Fetherston, commissioner of street cleaning of the City of New York, went on record against street sprinkling at a meeting held this week at the Automobile Club of America.

It appears that New York City has two contractors to do this work for a consideration, but it is brought out that sprinkling city streets makes street cleaning more difficult, it wastes water and is unsanitary. Efforts are being made to abolish the practice.

### Coming Commercial Vehicle Events

| | |
|---|---|
| August 18 | New York City, Monthly Meeting, Motor Truck Club of America, Automobile Club of America. |
| Sept. | Peoria, Ill., Second Northwestern Road Congress. |
| Sept. 13 | Oakland, Cal., Pan-American Road Congress. |
| Sept. 14-17 | Kimo, Me., New England N. A. L. A. A. Convention. |
| Sept. 20-25 | San Francisco, Cal., International Engineering Congress. |
| Sept. 24 | Indianapolis, Ind., S. A. E., first section meeting. |
| Oct. 4-14 | Wichita, Kan., Motor Exhibition, International Wheat Show. |
| Oct. 6-16 | New York City, Electrical Exposition & Motor Show, Grand Central Palace. |
| Oct. 11-12 | Dayton, O., National Paving Brick Mfrs.' Assn., annual meeting. |
| Oct. 18-19 | Cleveland, O., Convention Electric Vehicle Assn. of America, Hotel Statler. |
| Oct. 19-20 | Detroit, Mich., Safety First Convention, Safety First Federation of America. |
| Nov. 29-Dec. 4 | Electrical Prosperity Week. |
| 1916 | |
| Jan. 29-Feb. 5 | Columbus, O., Motor Vehicle Show. |
| Jan. 29-Feb. 5 | Minneapolis, Minn., Motor Vehicle Show. |
| March 4-11 | Boston, Mass., Motor Vehicle Show, Mechanics' Hall. |

# Budlong Quits the Packard Company

## Joins Gaston, Williams & Wigmore, Truck Exporters

NEW YORK CITY, August 11—Milton J. Budlong, who for 7 years has been president of the retail Packard houses in New York, Chicago and Philadelphia, has resigned to assume the vice-presidency of Gaston, Williams & Wigmore, of New York and London, the exporters who have handled a large part of the trucks purchased by European powers for war use, among which have been Packard trucks.

E. B. Jackson, manager of the Packard Motor Car Co. of Philadelphia, will succeed Mr. Budlong as the head of both the New York and Philadelphia branches, while H. M. Allison, manager of the Chicago house, will become its president.

Mr. Budlong started in the motor industry as secretary-treasurer of Siemen's & Halsky's Electric Co., Chicago, which was at that time controlled by the old Electric Vehicle Co., Hartford, Conn. He later became president of the Electric Vehicle Co. During the Selden litigation he became general manager of the A. L. A. M. He joined the Packard forces in 1908.

Gaston, Williams & Wigmore have increased the par value of shares of their stock from $100 to $1,000, reducing their number accordingly, without increasing the capital of the concern.

### MAY REGISTER TRACTORS

TOPEKA, KAN., August 10—The tremendous impetus given the tractors in Kansas during the past few weeks caused Curt Myers to express himself as of the opinion that the tractors should pay a license registration fee the same as motor vehicles, for they are harder on the paving of the roads than the rubber-tired cars. It is possible that legislation providing for the registration of tractors may be introduced at the next session.

### ELMIRA TRUCK PROJECTED

ELMIRA, N. Y., August 7—Organization of the Elmira Commercial Motor Car Co. has been completed. The concern has been incorporated in New York with a $500,000 capital. The plan is to produce a vehicle of 500 pounds capacity to sell at $300, after the designs of W. H. Ives, of the defunct Ives Motorcycle Corp., Owego, N. Y.

### MAIL TRUCK BIDS TO BE OPENED SEPT. 8

WASHINGTON, D. C., August 10—*Special Telegram*—On September 8 the post office department will open bids for furnishing and delivering from time to time as they may be required during the next fiscal year for use in the postal service, the following gasoline motor trucks: Five or more of ½-ton capacity; five or more of ¾-ton capacity; five or more of 1½-ton capacity; five or more of 3-ton capacity. Proposal blanks, specifications and blue-prints will be furnished upon application to the purchasing agent of the post office department.

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# New Macks to Come Out Next January

## Many New Features in Models Now Being Developed

NEW YORK CITY, August 10—The International Motor Co. is preparing a new line of heavy chain-driven Mack trucks which it is expected will not be ready before January 1. These vehicles have been undergoing very thorough tests in actual service, one of them being in use at the National Guard manoeuvres at Plattsburg, N. Y., at the present time.

The International company does not desire to reveal details until its tests have been completed and the vehicles are ready for sale, but they contain several features new to American practice and some that are wholly original.

The new vehicles will feature a new hood design of the French type, but designed to give a clearer view of the road with a copper-tube circular radiator, similar to the French Solex, incorporated with the dash. They will have all-steel cabs with vertical doors, front-mounted steering gears, and a peculiar removable pressed steel combination front cross-member and bumper.

The International Motor Co. is increasing its export trade through the efforts of its export department, located in a separate office in New York City in charge of W. T. Stevens, who is sending representatives into Africa, South America, India, China, Japan, Australia and other points in Oceania.

### WAGENHALS BANKRUPT

DETROIT, August 7—The Wagenhals Motor Co. has filed schedules in bankruptcy upon the application of its creditors. Liabilities are placed at $13,673.91, $3,858.45 representing the prior claim of W. G. Wagenhals, general manager, for salary due. Machinery, tools, material on hand, equipment and Mr. Wagenhal's patents constitute assets to the value of about $15,000. A meeting of creditors is to be held August 12. The Wagenhals company builds three-wheeled gasoline and electric delivery vehicles from 800 to 1,000 pounds capacity.

### B. A. GRAMM OUTPUT GROWING

LIMA, O., August 6—The Gramm-Bernstein Co., Lima, O., manufacturer of B. A. Gramm trucks, is busy on a large number of orders from foreign countries. At the present time the company has orders for 1,250 trucks and it was necessary to turn down a number of contracts because of lack of facilities.

B. A. Gramm, vice president and general manager of the company, makes it plain that none of the trucks are intended for war purposes but will take the place of trucks which have been commandeered by the governments of the various countries. They are also designed to take the place of thousands of horses taken for war purposes.

The company is now shipping 150 trucks per month and that number will be increased to 250 when the present extensions are completed and additional machinery installed. It is expected to have the additions ready for operation in October. Mr. Gramm says that foreign shipments for the present year will amount close to $3,000,000.

### RUMLEY TO BUILD SMALL TRACTOR

SOUTH BEND, IND., August 5—J. W. Toone, treasurer of the M. Rumley Co., La Porte, now in the hands of receivers, but shortly to be reorganized, states that the product of the concern will be a small tractor. There is no truth in the rumor, according to Mr. Toone, that Henry Ford is to purchase the Rumley plant.

### ROWE COMPANY EXPANDING

EAST DOWNINGTOWN, PA., August 2—Samuel J. Rowe, president of the Rowe Motor Mfg. Co., of this city, stated today that his company expected to break ground soon for an addition to its plant.

This addition will be necessary to increase the capacity of the plant, as the concern has recently received a contract for some foreign business. The extension will be 200 feet long and 70 feet wide, built of brick.

### FORD CHASIS $360

DETROIT, August 2—The uniform reduction of $50 on all Ford cars F. O. B. Detroit which was recently announced for the ensuing year, makes the Ford chassis, which is sold for commercial purposes, $360, the former price being $410.

The Ford runabout, which is used for light deliveries with a load box behind and also as a tractor for light trailers, formerly sold for $440 is now $390. The new prices apply up to August 1, 1916. The Ford company has announced an expected production of 500,000 vehicles in this time.

### CONVICT LABOR FOR MISSOURI

KANSAS CITY, MO., August 10—The counties of Missouri which are in earnest over road work may get the services of convicts from the state penitentiary under very favorable terms this summer and fall. Heretofore the counties have been required to furnish the guards, sleeping quarters and board of convicts working on county roads, as well as supply the machinery. The state prison board has declared in favor of more liberal arrangements and the state may not only provide the guards, but pay part of the board of convicts in order to give them employment and get the state's roads improved. Until recently convicts labored under a system of contracts with outside manufacturers; the contract system has been abolished in Missouri and the state has not yet provided factory or other work for the convicts. Therefore the possibility of giving the convicts work on county roads has been welcomed by the state prison board.

# Truck Plants Increase Pay—Cut Hours

## War Profits Being Shared by Five U. S. Factories

PHILADELPHIA, PA., August 2—An average increase of 10 per cent in wages accompanied by a decrease of 45 minutes daily in working hours is contained in an announcement posted about the factory buildings of the Autocar Co. of Ardmore today. Time and half time will be paid on all overtime work. The notice, which was signed by Walter Norton, vice president and production manager of the Autocar company, affects approximately 500 men, many employes having been added to the force since the outbreak of the European war.

### LOCO ADOPTS 8-HOUR DAY

BRIDGEPORT, CONN., August 9—Acceding to the demand of the machinists working for the Locomobile Co. of America here, President S. T. Davis today conferred with a delegation of employes and conceded an 8-hour day, thus avoiding what might have been a serious tie-up of the plant which is now being rushed to capacity on large orders for motor trucks from abroad.

The question of wages for this working schedule will be taken up at a board of directors meeting tomorrow. Mr. Davis will report to the committee next Thursday. The men demand the same rates for an 8-hour day as formerly received for a 10-hour day. Previously they had rejected a bonus proposition made to them by the Locomobile officials.

At the plant of the American & British Mfg. Co. a demand has been made for a 20 per cent increase in wages.

### INTERNATIONAL WAGES RAISED 20 PER CENT

NEW YORK CITY, August 5—A 20-per cent increase in wages and an 8-hour day have been adopted by the International Motor Co. at its Allentown, Pa., and Plainfield, N. J., plants, in each of which approximately 600 men are employed. This action has been taken as a means of sharing the profits on the large war orders the International company has received.

PLAINFIELD, N. J., August 7—The Bosch Magneto Co., the largest of the nine Plainfield factories in which the machinists have threatened to strike, announced today that it had granted the demand for an 8-hour day. This is acceptable to the men.

### OVERLAND ADOPTS 48-HOUR WEEK

TOLEDO, O., August 6—Forty-eight hours will constitute a week's work for the 20,050 Willys-Overland factory employes after November 1.

Though the regular working hours of all employes will be reduced from 50 to 48 hours a week, no reductions in daily or weekly pay are to be made. The reduction of working hours without corresponding decrease in pay is equivalent to a raise in pay proportionate with the reduction of hours of labor for all employes.

Under the new time and rate schedules time and one-half will be paid for all

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overtime and double time will be paid for services on Sundays and holidays.

The move follows an increase of 5 per cent in wages granted about 6 weeks ago. It is announced that night and overtime forces will not be reduced so long as the demand for Overland cars keeps so far ahead of the factory's production.

### TRUCKS AT TWIN CITY SHOW

MINNEAPOLIS, MINN., August 7—The Minneapolis motor vehicle show, to be held here January 29 to February 5, 1916, will have a special section for commercial vehicles in the annex of the National Guard Armory, passenger vehicles being exhibited in the main hall.

### E. V. A. MEETS OCTOBER 18-19

NEW YORK CITY, August 2—The sixth annual convention of the Electric Vehicle Assn. of America has been scheduled for Monday and Tuesday, October 18 and 19, at the Hotel Statler, Cleveland, O. The decision to limit the convention to 2 days was arrived at on the occasion of the organization meeting of the convention held in Cleveland, July 19.

The short period of the convention was determined upon owing to the other conventions which will occur in the fall and to the fact that it was deemed advisable to have a concentrated program consisting of real business rather than a longer and more social one, as busy men will be more likely to attend such a convention. Papers have not as yet been announced.

# A. A. A. Expert Probes Gasoline Prices

## Spear Will Report on Fuel Cost in October

ERIE, PA., August 2—A nation-wide investigation into the prices of gasoline has been inaugurated by the executive committee of the American Automobile Assn. This was determined upon at a conference of the executive committee held here at which Lewis R. Spear was delegated to conduct the inquiry, reporting in October.

Gasoline prices in New York recently were raised 1 cent, which jump was ascribed to the market conditions and summer demand by the officials of the Standard Oil Co.

### SAFETY-FIRST CONVENTION OCTOBER 19-20

NEW YORK CITY, August 4—The date for the first annual convention of the Safety-First Federation of America, to be held in Detroit, has been set for Tuesday and Wednesday, October 19 and 20. The program has not as yet been prepared.

# American Truck Builders Will Not Let War Interfere With Home Supply

## Rumor of Contracts for Entire Out Puts of Pierce-Arrow, Packard and White Officially Denied

NEW YORK CITY, August 9—A report published in a New York daily purporting to be a cable dispatch from Paris stated that J. P. Morgan & Co. had negotiated a contract with the French government for the entire motor truck output of the Packard, White and Pierce-Arrow companies for an indefinite period.

Charles Clifton, treasurer of the Pierce-Arrow Motor Car Co., Buffalo, N. Y.; C. R. Norton, truck sales manager of the Packard Motor Car Co., Detroit, and J. A. Harris, Jr., advertising manager of the White Co., Cleveland, have each denied that any such contract has been made or that they have any knowledge of negotiations for same. Each strongly brings out the fact that his company is not contemplating any exclusion of the very desirable and permanent domestic trade.

### PARTS EXPORT DEMAND COMING

LONDON, ENG., August 4—That American parts makers and manufacturers of complete vehicles should prepare now for the demand for motor truck parts which will follow the large sales of American vehicles abroad is the advice of a European army officer recently given.

Besides the demand on the part of owners of American motor trucks abroad there is every indication that the increased demand for motor trucks which is expected to follow the war due to reconstruction work to be done and to the destruction of former transport means will cause European manufacturers to undertake the production of assembled vehicles and the demands for American standard parts will be very large.

### BRITISH USE FORD AMBULANCES

NEW YORK CITY, August 8—P. L. D. Perry, managing director of the Ford Motor Co., Ltd., of England, arrived on the St. Paul in this city today. Mr. Perry will make his annual business trip to Detroit. Henry Ford, together with his son, Edsil Ford, Flank Klingersmith, the director of the plant, and Frank Mayo, chief engineer, met him at the pier.

Mr. Perry was questioned in regard to the truth of the reports that the company had received large war contracts. His reply was a denial of any such contract. He stated, however, that the company is making about 15,000 cars for the British government for use as motor ambulances.

The war has not affected the company's business in England and the concern does not expect a boom after peace is declared because its factories are running at full pressure all the year around.

Mr. Perry said that the Ford factory at Manchester, England, employed 1,600 hands and paid 50 per cent higher wages, grade for grade, than any other motor car concern over there.

Up to August 1, this year, the company sold 12,500 cars and had 8,500 on order, which included 600 ambulances that were sold to the government. The output was almost a 50-per cent increase over 1914. The engines and axles are made at Detroit and the other parts, including the bodies, are made at Manchester.

The British government sent 100 soldiers from the Army Transport Service to the Ford works for 2 weeks at a time to learn how to repair machines in the field and how to put them together.

The $410 chassis sold in the United States cost $495 in England, the extra charge being made to cover the cost of packing, insurance and transportation.

### ALLIS-CHALMERS TRACTORS FOR RUSSIA

MILWAUKEE, WIS., August 3—An order for a number of new tractor-trucks produced by the Allis-Chalmers Mfg. Co. has been received from Russia. These trucks are different from the ordinary commercial vehicle in that they are fitted with creeping or track-laying traction devices in place of the rear wheels and their front axles are pivoted at the center to allow them to negotiate rough roads. They have steel tires in front and steel tracks in the rear.

### VELIE SELLS 600 WAR TRUCKS

MOLINE, ILL., August 2—The Velie Engineering Co. of this city, has received a contract from the French government for 600 light trucks. The stipulation is that 275 vehicles on the order must be delivered at New York by January 1. The majority of the trucks are of 1-ton capacity.

The Marceilles Co., of East Moline, has received an order for a large number of portable kitchens used by the French and English.

### FOR NARROWER KANSAS ROADS

HUTCHINSON, KAN., August 10—Will S. Thompson, a motor car dealer of Hutchinson, has suggested that the state furnish convict labor to improve the roads, that the farmers owning property abutting on the roads to be improved pay for the material by special improvement taxes, the county paying for the improvement of intersections. The farmers would be reimbursed for

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the cost of the material by being deeded 18 feet of highway—most roads being 60 feet wide and a 16-foot paved road with a 4-foot paved gutter on each side being amply sufficient for traffic purposes.

Last winter in the state legislature the proposal was made to narrow all country roads, by which many millions of acres would be saved to the farmers. This plan, as well as the plan of Mr. Thompson, does not take into consideration the ground necessary for making slopes when deep gutters or fills are called for. But it is recognized that the plan would work well in comparatively level districts.

# Year's Truck Exports 18 Times Greater

## June Ends Record Year of Truck Shipments—14,000 Trucks Worth $40,000,000

WASHINGTON, D. C., August 8—Exports of commercial vehicles from the United States to foreign countries have totaled 13,996 numerically and $39,140,682 in value for the fiscal year ending June 30, 1915. For the fiscal year previous exports were 784 trucks, valued at $1,181,611; thus the increase in exports is 13,212 vehicles, or $37,959,071.

Eighteen times as many trucks, representing thirty-two times as much money, were exported in the year past than in the previous year. The trucks exported in June numbered 2,990, valued at $8,578,802. A year ago the June exports were 90 trucks worth $120,257. The increase for the month of June alone was thirty-three times numerically or nearly seventy-two times the value.

The summary for the fiscal year with a comparison for the year previous are given below:

### Motor Truck Export Résumé

| Month and Year | Number | Value |
|---|---|---|
| July, 1914 | 50 | $106,400 |
| August | 60 | 124,016 |
| September | 128 | 294,288 |
| October | 672 | 2,286,964 |
| November | 842 | 2,244,518 |
| December | 1,279 | 3,387,729 |
| January, 1915 | 935 | 2,545,527 |
| February | 1,502 | 3,220,482 |
| March | 1,839 | 4,725,363 |
| April | 2,267 | 5,240,481 |
| May | 2,426 | 6,583,912 |
| June | 2,990 | 8,578,802 |
| **Total, 1914-15** | **13,996** | **$39,140,682** |
| **Total, 1913-14** | **784** | **1,181,611** |
| **Increase** | **13,212** | **$37,959,071** |

### $76,671,667 HORSE EXPORTS

WASHINGTON, D. C., August 8—During the fiscal year of 1915, 289,340 horses, valued at $64,046,524, and 65,788 mules, valued at $12,625,143, were exported. Of this number 40,083 horses and 12,916 mules, valued at $8,093,419 and $2,542,302 were exported during June last. The total value of the horses and mules exported during the year ending June 30 was $76,671,667.

### AMERICAN CHANCE IN NORWAY

WASHINGTON, D. C., August 5—A Norwegian concern through the Bureau of Foreign and Domestic Commerce at Washington has announced that it desires to get into connection with American makers and exporters of tires, accessories, dry batteries and motor trucks with a view to securing an exclusive agency for the sale of these lines. The firm also states that it is in a position to pay cash. The opportunity is listed by the department as No. 17,790.

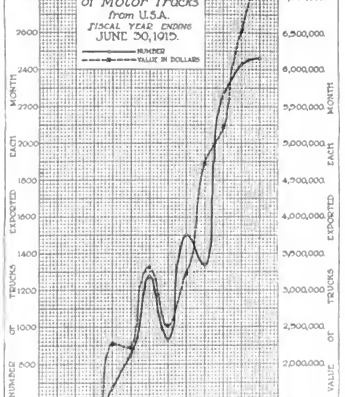
# Britons Would Ban U. S. Trucks

## Dog-in-the-manger Attitude Assumed by English

LONDON, ENG., August 6—Protection against the American invasion of British motor vehicle markets is being sought by British motor vehicle manufacturers. Appeals have been made to members of parliament for either the prohibition of imports of motor vehicles or the imposition of a high import duty. They point out that owing to the absorption of the greater part of the motor output of England by the government they are unable to meet American competition.

On the other hand, it is pointed out by the importers of American vehicles that British makers are now earning more than ever through war contracts and that while they are losing domestic trade to American builders their plants are running at forced draft and they are selling to a market which costs very little to secure.

British merchants who have had both motor vehicles and horses taken from them by the government are forced to adopt American vehicles to carry on commerce. The real status of the matter seems to be that British makers fear that having once used American trucks English merchants and tradesmen may continue to buy them thereafter, even though home supplies are again made available.

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## The British Lorry *vs.* The American Truck

(Continued from page 12)

block-type high-speed passenger car motor being admirably adapted to use on trucks with suitable gear-reductions. The same applies to clutch and gearset. Our makers of component parts have been producing axles, steering gears, wheels, etc., specially designed for the commercial vehicle work for years, and the question of nice balance among different units in an assembled truck has been worked out practically as carefully as in the passenger car field.

Another British attack against the present foreign motor truck invasion is that in America there are few pioneer truck builders, rather that motor trucks in America have been built as offshoots of passenger car factories, often for the sole purpose of making production possible. Again we can turn to that impossible curtain of ignorance behind which the British truck man stands in his relationship to the American industry. The majority of the leaders in American truck production today are exclusive truck makers. The leading builders of both cars and trucks have separated the two beyond any semblance. In England, in France and in Germany the largest truck producers also build passenger vehicles. What applies to America must apply equally to European countries.

At the start not a few of our passenger car builders who took up the truck field began by adapting passenger car units, but that was 10 years ago. Changes too numerous to mention have taken place since then and today it is conservative to state that the backbone of the American truck industry is founded on special truck designs the same as in the passenger car trade, whether these designs are the products of individual factories or made up of components produced in quantity in different factories.

What Britain needs is more information on the American truck industry. More facts and fewer hallucinations. America would do well to launch a consistent, authentic campaign on American products, so that the Britisher and the Continentalist as well, will at least be familiarized with the basic facts of the truck industry in America and the status of American truck builders and American truck methods. There will be some bad mixed with the good. Nobody regrets this more than the legitimate American builder, but bad and good can be brought out together. It is **information** that is needed.

## A Criticism and an Answer

An article in a British contemporary represents the reasoning back of this blind opposition to anything not British by the extremists among the English public. This article has been vigorously protested by many of the British motor dealers, who have had dealings with American builders.

Following will be found excerpts from the article and comments thereon which give the gist of the discussion:

> "With the exception of a few concerns in the United States, the heavy-vehicle industry there is in the hands of speculators, who lack the pride of craftmanship exhibited in this country."

If producing more good trucks than all the rest of the world combined, and doing it consistently, year after year, be speculation, then the statement is true, American truck makers are speculators.

If "pride of craftsmanship" means the love of mechanism for its own sake rather than as a means to an end, happily American builders are too practical to possess a superabundance of it.

> "The majority—of American trucks—are made up of components which are manufactured in large quantities, and are identical in makes marketed under dozens of different names, with the result that, if a design prove to be faulty, the faults are perpetuated through a large portion of the American motor trade."

Lack of standardization of this sort has proven disastrous to the British war Office despite a subsidy scheme designed to bring it about. It is unlikely that a mistake in design would as easily go unnoticed where one organization builds motors, say, in 100,000 lots, and nothing but motors, to be used in commercial vehicles in every conceivable sort of service by dozens of assemblers than would be the case were every truck maker to build his own motors, work out his own designs, with little or no recourse to the experience of his contemporaries.

Successful design is based upon service experience. Unless the manufacturer has a production which runs into the thousands he cannot individually get this experience, while the component specialist can and does get it from a great number of truck makers who buy of him.

> "Without having in any way specialized in the design of heavy vehicles, American manufacturers have entered the truck field with an article which shows in a good many cases, lack of experience and of realization of the fact that the two industries—passenger and commercial vehicle manufacture—although so closely allied, have really very little in common."

This allegation was true of the American industry at one time, as it was true of the British motor trade, but it no longer holds good. The fact that some of the largest truck builders also build passenger cars is due to the desire for the balancing effect of the two industries to make up for seasonal fluctuations in demand and for better distribution of overhead.

Technically the two products are entirely separate, being built in different shops, designed by different engineers, and each being developed independently. Thus may be seen practices in one field which are quite foreign to the other, yet both adhered to and indorsed by the same organization.

> "The motor truck industry in the United States is inherently unsound. One frequently hears of failures of concerns which claim an output of 100 or more chassis per month."

There are many times more builders in the United States than in England, and so naturally there are more failures. These, however, are mostly confined to the smaller and more irresponsible firms, with a few exceptions. The proportion of failures to survivals, however, are not at all alarming. Even an American Locomotive Co. may withdraw in America without creating anything like the disturbance that the failure of one of the leading British or French firms would make.

> "The path of the heavy-vehicle industry in America is strewn with a good many failures directly attributable to * * * unbusinesslike methods."

All of which is true of the American truck business as of every other new industry, and the lessons learned by these tragedies have been well learned. Business methods which are bad, however, have nothing to do with the technical quality of the wares handled, nor with the value which the buyer gets for his money. Bad business methods are boomerangs and harm mostly those who practice them.

> "America can offer us nothing as regards heavy vehicles that we cannot ourselves produce at lower prices and better quality. Until the outbreak of the present war it was possible for British manufacturers to import into the United States and sell at a profit chassis of British manufacture, in spite of the heavy import duty of 30 per cent. All chassis of best British manufacture will compare favorably in New York with prices American manufacturers of repute are charging for their products in their domestic market."

America can and does produce chassis that are giving good service in France, England, Russia and other European countries. The English, French and Germans have failed to compete with American vehicles in our home market in spite of the delusion cherished by some Americans that Europeans can do everything better than we can.

British and American prices about correspond in London at the present time, even with the exorbitant freights and insurance rates being exacted because of the war.

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Whatever advantage the British enjoyed previous to the war in the way of cheap labor was offset by the economy of American quantity production, the more extensive use of automatic machinery, and design calculated to render assembly more simple. The advantage of the British on the score of labor will disappear after the war, due to the scarcity of labor which will prevail and the large demands upon it in the work of reconstruction, while progress in American manufacturing economies is constantly increasing—our chassis are getting lower in price and better in quality every year.

"Expensive organizations and large showrooms are kept up, free service is promised and sometimes given and all salesmen are remunerated at a rate which is out of all proportion to the effort required * * to sell a satisfactory article."

If American dealers get high commissions it is because they are required to give free service to a greater extent than in England, so that while the purchaser pays more than he might, he gets more. American dealers are not getting rich nor are American truck factories overprosperous.

"So long as the heavy vehicle industry of the United States suffers from its present incumbrances and the system of assembling components made by the thousand by component manufacturers is continued to the detriment of individuality in design, British manufacturers will always be able to hold their own in competition with our American friends."

It is passing strange, then, that Britons should be so much concerned over their inability to compete with the American light car, which likewise challenges all the world to duplicate in quality at anything near the price. It is strange that one factory which produces such vehicles consistently reduces its price as its production increases and then turns profit out of the business than it can take care of in regular ways and must perforce return some of it to purchasers and share it with its employes.

If British makers can withstand American quantity production in trucks, why not in passenger cars. Vehicles which are assembled in moderate quantity but from parts turned out, not by the thousands, but by the **hundreds** of thousands, take on very much of the same advantages that accrue to production in vast quantities under one roof.

"Americans claim several advantages for the system of assembling purchased components, and their principal claim is that a firm manufacturing an article by the thousand must produce it better and cheaper than one making a few dozen only. That it may be so in connection with boots, shoes or goods expressing little, if any individuality, but it does not apply with any degree of force to a piece of machinery."

It is hard to realize that one familiar at all with modern industry could make such an obviously absurd statement, or that an informed publication would print it. The case for quantity production is nowhere stronger than in the construction of machinery, which is why American shop machinery and machine tools are pre-eminent the world over. It is why interchangeability is so exclusively an American characteristic. It is why German products in certain other lines have proven such a bugbear to manufacturers of all the rest of the world, even the U. S. A.

"A chassis made up of components produced by different manufacturers can, at the best, only be something in the nature of a makeshift. There is no scope for emulation on the part of designers and the absence of individuality is a bar to improvements and progress."

The fact that assembled chassis can and do successfully compete with our own exclusively-manufactured products proves that this "individuality," so dear to the English builder, is a fetish and a false idol.

It expresses itself in England by crudity of outline that is quaint by the side of the trim, businesslike outline of American vehicles, by abbreviated fenders, by cabs that do not harmonize with chassis or hoods, hoods of unnecessarily large size and ungainly shape, covering unnecessary waste space. Rough looking spring horns, spring shackles needlessly bulky, stiff seats, too high, uncomfortable and lacking in leg-room, and absence of interchangeability of parts, one truck with another, are other examples of a sort of individuality that American builders, happily, do not indulge in.

However, to allege that standardization as practiced in the States is a curb to progress is unjust. Many of the foremost of our builders are true manufacturers in just as great a degree as are the British constructors, and the development work among these has reached a point in advance of that which British, French or German makers have attained.

"Factories marketing an assembled chassis have very seldom on their staff men who are thoroughly familiar with all its details."

Of the smaller assemblers this is true. They do not need such men. An assembler is not to be considered in the same light as a manufacturer of an entire vehicle. He buys components which are of proven worth and recognized as standard articles. He has the engineering skill of the great concerns from whom he buys at his command, and their advice is usually of more value to him than would be that of a single jack-of-all-trades engineer in his own organization, regardless of how much money he might squander upon him.

Do British truck makers build their own tires? Why should one make his own axle, if he turns out numbers less than some thousands a year, when a specialist in axles can build him a better one and sell it to him for less money?

A factory building a few hundred axles in a year, in the same shop where motors, gearboxes, bodies and radiators are built, cannot hope to employ engineers and metallurgists of as high a grade as the firm which makes axles in hundred-thousand lots. It cannot secure as good equipment nor as skilled labor. It cannot command the same steels, nor conduct as careful heat-treating.

It can be sure that the shape of the axle is a freak one, but that is about as far as its individuality goes. As well ask manufacturers to smelt their own ores, to make their own bolts and nuts, and improvise their own magnetos and carbureters.

American builders have no apologies to offer for mechanical construction. American trucks are making good all over the world, while European trucks have not succeeded in getting a foothold in this country. The superiority of American productions will be made apparent when, after the war British trucks are once more put on British roads in competition with American trucks. The beautiful boulevards of England will not be as of yore. Much heavy transport work has reduced them to a state of repair as bad as the average American road. British trucks have repeatedly failed to stand up on such roads as these, and they will similarly fail on their own ruined highways while American vehicles will be in their natural element.

## You'll Not Catch Him Napping

(Continued from page 13)

promotion as opportunities occur. When he put in the electrics it was easy for his good men who had been driving horses, and knew the routes and the business, to make the shift. He takes pride in the fact that one man who had been on horse delivery 10 years, and was over 50 years old, made good from the start on the electric.

He says it is his job to know before the knowledge is needed. Bluff and stall are words he wouldn't understand.

"If I were to make mistakes when my drivers ask me questions the most ignorant man in the lot would soon think he was working for a man who didn't know his business, and lose his respect for me, and that would mean for me loss of control, and failure."

Co-operation of the executives of his company has been a big thing toward enabling the Broadway delivery department to make the increases in size and efficiency required by the growth of the store's business. The store is just opening a big addition that would never have been needed if it had stuck to horses and the territory it could reach with them. The management gets reports fully covering the performance of his department. He has an emphatic conviction that it is important for the executives to know the workings of the delivery department. For one reason, it is the department that sees the customer last, and acts as a seine that scoops in all the refuse. It is the department that gets a bulk view of the business. And under real management, with the confidence and co-operation of a broad-minded general manager, the Broadway has achieved a delivery department that instead of being classed as an expense is much more fairly reckoned as a producer.

One thing the Broadway officials do that shows how big they are is to supply him with the general store overhead costs that are charged against his department. He keeps in his own book the daily mileage, stops, and detail costs of each vehicle, with the driver's name, and makes weekly and monthly summaries, including insurance and depreciation. The general overhead he keeps as a separate and secret record, but says it is invaluable, because it enables him to know positively whether every truck is actually paying on a basis. Every truck must actually pay on its run or the delivery manager cannot succeed. But, if there are actual costs that are charged against him, but are not known to him, how can he help missing out on some runs that are hard to figure?

Suppose the general manager is having a session with a truck salesman, and tells him that the truck he sold him 3 years ago has been out of service several days in the past year, and the salesman argues that it was probably on account of the bearings, which have been improved in the models put out since the original model was bought. The general manager can call the delivery superintendent, who without laying down the telephone will tell just what days the vehicle was out of service, how long, for what repairs, and what each repair cost. He can give the complete working history of every machine.

It takes a mighty wise gallon of gasoline to fool Albert E. Amos and his little leather book.

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# War and Paris Buses

The London bus * * * * * is a weakling in the rough and tumble of the battle front

Left, new type of Paris bus chassis with military body attached

## Army Takes Cars Parisians Walk

By W. F. Bradley

PARIS, July 20—During the 12 months preceding the breaking of the European war cloud 151,919,920 passengers were carried in Paris motor buses. Since August 1, 1914, to present date, or more than a year when this is read, not a single civilian has traveled by motor bus through the streets of Paris. According to an arrangement with the war department, all Paris motor buses had to become army property whenever a general mobilization order was signed. Thus the buses returned to the central depot as soon as the bill stickers had begun to paste the government notices on the city walls, and there each bus was transformed from a passenger-carrying vehicle to a meat wagon. The necessary material had been prepared in advance, in the omnibus company's own body works, and the work was carried out with such rapidity that within 48 hours there was not a motor bus within the city of Paris.

### Indemnity of $4,467,453

A total indemnity of $4,467,453 has just been accepted by the motor bus company for material taken over by the war department. As there were 1,120 buses in Paris, this represents an average of $3,988.80 per motor bus. Account must be taken, however, of the big quantity of benzol and the stocks of spare parts and tires which were requisitioned at the same time, payment for which is included in this sum.

The year preceding the outbreak of the war was the most successful the Paris General Omnibus Co. had ever experienced. When its concession was renewed about 3 years ago the stipulation was made that the material should be modernized. Thus all the horse buses had been abolished, the city services had been extended and experimental lines were being run into suburban districts unprovided with other means of locomotion than the railroad. The following table shows the general operations of the motor buses for the year 1913-1914:

| | | Increase |
|---|---|---|
| Number of buses. | 1,120 | |
| Mileage ..... | 14,513,029 | 2.71% |
| Passengers ..... | 151,919,920 | 3.68% |
| Receipts ..... | $4,268,912 | 2.97% |
| Receipts per mile. | 29.414 cents | 0.25% |

The motor bus situation in Paris is different from that in any other city. The General Omnibus company holds an exclusive concession from the Municipal Council for both motor bus and trolley car services. The two services have to be combined, for no company would undertake to run the trolley car system alone. The agreement stipulates the price of fares, the number of buses to be employed as a minimum in each section of the city, and the frequency of service. The company can increase the number of buses and create new routes wherever there is a demand, but is not allowed to abolish a line on the plea that it is not a financial success. On the other hand, it is guaranteed against outside competition.

### Chassis Built for War

The arrangement with the war department is quite independent of that with the city authorities. Under the former the bus company receives an annual indemnity on the understanding that the vehicles can be requisitioned at a moment's notice if a state of war is about to be declared. Because of the fact that they may have to go into army service, the buses are heavier and stronger than is really necessary for city work. This army regulation also requires them to be exclusively of French construction. Magneto, carbureter, tires and all other components are produced in France of French material. It is because of the strict army requirements that the company has confined itself to chassis built by Schneider and De Dion-Bouton.

No trouble has been experienced with these buses during the year they have been on war service. Indeed, the army authorities are so satisfied that since the outbreak of the war big repeat orders have been placed with the Schneider and De Dion-Bouton companies for the identical type of chassis to be fitted with special bodies for carrying troops. These new vehicles only differ from the original buses by reason of the body, which is lighter and cheaper than the one necessary for city service.

### London Buses Too Light

London has also supplied a few thousand of her motor buses for service in France, but the results have been very indifferent. The London bus is the victim of too much specialization. It is equal, if not superior, to the Paris bus for city work, but as every repair shop officer will testify, is a weakling in the rough and tumble of the battle front. The lesson, of course, is that a motor vehicle designed with a view to the lowest operating cost in city service only is almost inevitably defective on a wider and rougher range of work.

Paris is likely to continue to be without buses for a considerable period. Since it lost its fleet the company has designed a new type of bus embodying a number of body improvements, and has had 100 of them built. Before they could be put on the streets they were all requisitioned by the army authorities. The

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company has now ceased to make promises regarding the date of the resumption of the bus service. It is intimated that buses may not be running before next year. Meanwhile the city is getting along as best it can with a trolley car service where nearly all the fares are collected by women.

# Our London Letter

By R. Douglas-Vickers

LONDON, July 23, 1915—At first sight a survey of the British commercial vehicle situation as it has been during the past 6 months does not reveal any striking features or peculiar conditions. Production at all the factories has gone on apace, and, in some cases, the output has been increased. When the year 1914 drew to a close it could not be said that the entire resources of the truck making firms in this country were being utilized, as a number of the smaller companies were producing and offering vehicles for purely civilian use. That, however, has been gradually changed, as the authorities have been able to gauge the needs of the new armies and the facilities for production on the part of these smaller factories. In the case of a number of important passenger car factories the situation has been eased by their undertaking the manufacture of parts for heavy trucks for other companies, as well as the erection of the trucks themselves.

The foregoing remarks apply, of course, to gasoline vehicles, but the country has, this year, tapped in earnest the sources of steam-driven truck supply, and are utilizing this type of vehicle in certain work on the continent, and very largely in doing heavy transport duty in and around the hundreds of military camps which are scattered all over the United Kingdom. The steam truck builders can therefore meet civil orders only with great difficulty. An an instance of the demand which exists for any available vehicle of the best-known makes, a Foden 5-ton truck which had seen 12 months service fetched, early this year, at a public sale, $3,500 odd, which was at least $500 more than it cost when new.

I have been making careful inquiries in various well-informed quarters as to the output of British factories, and the information which I have received is most striking. Much of it was of a confidential nature, but, I am able to state, that since January 1 some 7,000 trucks have been turned out of British factories for military purposes, or an approximate average of 250 per week. These comprise the two main types already found useful for military service, namely, of 3,360 pounds and 6,720 pounds load capacity, respectively. It is almost unnecessary to state that spare parts are being produced upon an enormous scale, and that involves huge stocks being maintained at important points in England and in France.

### Field Repair Shops

Another and most interesting feature is the field repair and overhaul factory. Without going into precise details you can walk down long rows of trucks receiving attention in just such order as you will find them in any well-managed factory—bay after bay—reminding the visitor of some of the shops at Coventry or Detroit. Here are, in many cases, thousands of skilled mechanics under the control of officers who, before the war, could be met with in one or other of the large British motor factories.

Some collossal gasoline tractors have been built here mainly for the haulage of heavy artillery. One type, fitted with the well-known Knight sleeve valve engine of 105 horsepower, is being used in fairly large numbers and has been constructed by the Daimler company.

The American trucks which are being used in France and Flanders are building up a reputation for your industry that ought to make the builders prosperous in days to come. A highly-placed officer in the Mechanical Transport Section of the Army Service Corps assured me recently that they greatly appreciated the splendid service the U. S.-built vehicles were giving, and he added that the makers were to be congratulated on the high quality standard that they had attained to within recent years.

American motor truck engineers, whatever their private political views may be, are rendering the Allies of the *entente* a service of which they and we may be justly proud. I had an opportunity recently of seeing what was probably the biggest collection, or park, to use a military term, of American trucks ever got together. It comprised about a thousand machines and was a most impressive spectacle, representing, as it did, a monetary outlay of at least $3,000,000.

### Getting Acquainted

The range of American-built commercial vehicles now being marketed in this country is quite astonishing and it is impossible to predict with any degree of certainty which makes will come out on top. I believe that there was a general impression prevailing here until quite lately that products from your factories must necessarily be lower-priced than vehicles produced here. Those who knew anything of the truck situation on your side of the water knew, of course, that there was no foundation for any idea such as this. It owes its origin, I think, to the prices at which many American passenger cars have been sold in England, such as the Ford and others, and I suppose that it was taken for granted that conditions were the same in both sections of the industry.

Gaston Williams & Wigmore, Ltd., of Alexandra House, Kingsway, London, appear to be the selling agents for quite a large group of American truck manufacturers, and they certainly have got a range to suit all tastes. This includes the Peerless, Packard, U. S., Kelly-Springfield and Selden.

Quite a number of Pierce-Arrow machines are to be seen about, whilst Standards, Signals, Chase, Federals, Willys, Burfords and Whites are, to my knowledge, making history in commercial transport circles. A Scottish company has brought over a number of Vulcan chassis, and from what I hear these have already been snapped up by purchasers.

### Assembling American Parts

Other concerns are importing parts from the United States and assembling trucks here, so that altogether manufacturers both of complete chassis and of components ought to do quite well out of the present situation. There seems to me to be room on this market for a good type of steel wheel for commercial vehicles, as the principal supply, at the present time, is being obtained from Switzerland. There are, of course, a number of high-class wheel makers in this country, but they do not by any means meet the demand.

On the general question of the importation of American trucks there are slight signs showing that some British makers rather resent the freedom from restrictions with which such imports can be effected, whilst they themselves are prevented by the military authorities from doing any business with ordinary traders who must have vehicles. Customers are urged to wait until the home factories are free, but it is doubtful whether if peace were declared tomorrow these could give deliveries in anything less than 9 or 10 months time for orders placed now. It is idle talk, therefore, to suggest that important transport inter-

(Continued on page 25)

An official visit in Paris to a fleet of Berliet trucks offered by the Empress of Russia for ambulance service in the French army

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The last word in luxury—front-entrance bus running between San Francisco, Burlingame and San Mateo

# Luxury Is Motor Bus' Appeal to the Public

## New Lines Offer Comfort and Convenience Unavailable by Other Means

LUXURY is the dominant note in recent bus progress. A competitor of the street car's and the challenging glove thrown down, greater comfort has been the line along which bus operators have striven to gain an advantage over their intrenched adversaries.

The motor bus cannot, except in rare instances, give faster service than the street car, in ordinary service, because it is hampered by speed laws which the street car, however unfairly, is not. It cannot give cheaper service than the street car, and it is beginning to look as though, with all of the restrictions which are being put upon them, bus lines would have to come to charge more than the conventional jitney.

The appeal is therefore one of luxury—of greater comfort, quiet, a more exclusive company of passengers, less crowding, more pleasant routes than the store-strewn business streets. Certainly this trend is logical, for the appeal of the motor bus from the first has been that of something better than the street car, savoring something of the exclusiveness and auspiciousness of the taxicab or private car, and yet within the reach of all. To cater to the demand for luxury has always been good business. It is often better business than to supply necessities. Most of our every-day necessities and conveniences were one day wild extravagances.

### Successful Frisco Line

The new front entrance buses of the Peninsula Rapid Transit Co., operating between San Francisco and the wealthy residential suburbs of Burlingame and San Mateo, some 22 miles out, are the latest and most interesting development in the Exposition City's motor passenger transportation development. The bus line, managed by C. O. Ellingwood, who made a big success of the Tacoma-Puyallup line, uses six White trucks, and a seventh, kept as reserve for emergencies on week days, is used in its heavy Sunday outing traffic.

Bodies are fitted to give great comfort, built by Meister of Sacramento, and wheels carry pneumatic tires.

These buses are of the pay-as-you-enter type and accommodate twenty-four passengers. The cars are electric lighted and are heated from the engine exhaust.

Compared with the ordinary motor bus, these bodies are as Pullman parlor cars to ordinary street cars. The seats are individual chairs, luxuriously upholstered in heavy leather. The chairs are set in three rows, those along the side being slightly at an angle, thus accommodating a greater number of passengers in comfort than if they were squared either forward or toward the middle. The middle row faces forward, and the aisles between render every seat accessible.

Luxury is further increased by a quilted leather wainscoting half-way up the sides of the interior, much after the fashion of an expensive limousine.

In front, the driver's cab is made full width of the car, thus providing accommodation for smokers in side benches. These, like the rest of the vehicle, are leather upholstered,

Interior views of San Mateo buses—above, driver's seat in smoking compartment; below, the main salon looking forward, showing individual chairs and limousine finish

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the driver occupying an individual swivel chair. The smoking compartment is considered a necessity for these long suburban runs as the buses will be patronized by commuting business men.

The suburbs served are the homes of the most wealthy and particular class of San Francisco business men, and the scenic advantages of the highway route, comfort of the cars and reliability of the schedule inforced not only with relation to terminal but intermediate points, is developing a traffic that is not only heavy, but regular, against competition of good transportation by steam and electric lines.

The line gets out a regular time table, and the drivers run by their watches on schedule. Manager Ellingwood insists upon this as the first principle of success in operating a bus line.

## A Boon to Newlyweds

ONE of the first sights that greets the pilgrim to Niagara Falls as he alights from the train at Buffalo is one or two of C. W. Miller's transfer buses, of which there are five in daily service. These buses are owned by the largest transfer company in Buffalo and took the place of eight horse buses in the spring of 1913, something like 2½ years ago.

These buses ply between the New York Central, Lackawanna, Erie and Lehigh Valley passenger depots, transferring passengers who change cars at Buffalo for Niagara Falls, Canada and points on other lines. They each seat twenty passengers and are built on 1-ton Horner chassis.

The neatness of their French hoods, the almost invisible blinding of the radiator with the dash, their flashing electric lights and their extraordinary silence which bespeaks the careful shop attention they receive occasions surprise when one first learns that they are gasoline-powered.

The hauls are short, but the ways between the different depots are devious, and travelers are glad to give up 25 cents for the comfortable and expeditious ride. The traffic reaches a maximum of about 500 passengers per day, which is considerably more than the horse buses ever had to contend with, and still the buses have reserve capacity for a much greater traffic increase than is anticipated by even the most sanguine of Buffalonians. Five buses are needed, however, for no one bus could handle two runs at once owing to the arbitrary train schedules which must be conformed with.

Six of these buses carry 1,000 passengers daily between San Francisco and one of its newer residential developments

In the season when the stream of honeymooners on their way to the falls dwindles, and the commercial traveler is the mainstay of the transfer business, the daily fares amount to 150 to 200.

The buses are original in design, the colonial ideal being carried out in the bodywork. They are operated by one man, the entrance and exit door being on the right side, the driver-conductor sitting to the left. The seats are arranged along both sides and across the end, with practicable windows all around. These windows have small top sashes of translucent glass to carry out the colonial idea, which idea is further enhanced by an arching roof. This roof is arched both fore and aft and transversely, giving ample headroom within together with a low appearance from the outside.

Curved covers are fitted over the running boards on either side to prevent boys from stealing rides, and the vehicles are lighted and headlighted by electricity. Although solid tires are employed, the vehicles are made silent and easy riding by the use of Sewell cushion wheels.

The C. W. Miller Transfer Co. operates twenty-six Horner baggage trucks for the transfer of baggage between stations and hotels. It also operates a taxicab service. Mr. Miller is a veteran horseman, but was forced to motorize to maintain the lead in his city. His taxicab stands are in all of the

C. W. Miller's Buffalo transfer buses

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principal hotels in Buffalo, which secures for him the bulk of the baggage trade. Formerly he operated fifty-eight wagons and 140 horses in the baggage branch of the business and 125 horse cabs. Sixty-seven taxicabs have replaced the latter.

He maintains his own repair shop and from time to time builds his own cabs, so that he is independent of service stations.

## Baltimore's P. A. Y. E. Buses Pay

CHARLES STREET is one of the main thoroughfares of Baltimore, Md., but for some unaccountable reason it is very poorly served by street cars. It runs through the center of the fan-shaped business center straight out from Baltimore street to University Parkway, passing the Union Station, North avenue, on the main motor route to Philadelphia, and Johns Hopkins University. A motor bus line has been installed on this thoroughfare which gives direct and rapid transit at jitney fare.

The Paye Bus Co., a closed Maryland corporation with $25,000 capital, started the operation of this line on June 8 with four yellow buses on Buick 1,500-pound chassis having a seating capacity of sixteen passengers. Each bus is equipped with a folding door which covers all the steps but the lower one which folds up flush with it. The driver sits to the left and a coin-box register receives the fares.

Paye, the name of the concern is an initial word made up of the phrase Pay-as-you-enter. The Charles street route is 3 miles in length, all four of the buses being operated on it. Three trips an hour are made by each bus, so that 5-minute headway is maintained. The buses run 18 hours a day, being operated by two shifts of 9 hours each.

Fifty-four trips are made by each bus daily, or twenty-seven round trips of 6 miles each. This totals 162 miles per day. In this mileage, the buses take from 350 to 400 fares daily, according to G. R. Eisenhaur, general manager, of which he estimates about 75 per cent is operating cost.

There are no special restrictions on motor buses in Baltimore, beyond the requirement of a cash register and a limited amount of regulation by the Public Service Commission. The buses, while they have only a seating capacity of sixteen besides the driver, carry twenty-five passengers in greater comfort than afforded by the street cars.

Owing to the near-side pay-as-you-enter body arrangement one-man operation is thoroughly practicable, and the drivers are neatly uniformed. "If in Doubt, STOP," is the motto over each driver's windshield.

The bodies are built of wood, and are very solid jobs, though a trifle high for any but a straight-away route. The seats are longitudinal, and sanitary hand straps are fitted. The buses are electrically-lighted and are remarkably smooth-running. The bodies were built by Biehl's Carriage & Wagon Wks., Reading, Pa.

The Paye Bus Co. plans to install larger buses on other routes in the future. The buses bought hereafter will be on 2-ton chassis with transverse seats for twenty-eight passengers, and a total capacity for thirty-five. They will be of the near-side pay-as-you-enter type.

### Baltimore Jitneys Too Small

Mr. Eisenhaur is pessimistic in regard to the small-car and touring car jitney, of which Baltimore has quite a number threading its crowded lanes. A number of jitneymen have fitted fourteen-passenger bodies to Ford chassis. The weight of these and the 1-ton passenger load that this means spells quick depreciation. Others have acquired heavier chassis, but the Paye company was the first to inaugurate

A Paye bus in Baltimore

a really genteel line of buses affording accommodation to as many as twenty-five persons with the comfort of easy springs and pneumatic tires. He is not ready to indorse the forty-seated double-deckers for Baltimore, but he believes that the medium-large bus as outlined above will be the eventual type.

## Patriotic Tours Made Easy

YELLOW is becoming a popular color for motor buses. The Paye buses in Baltimore are yellow, and recently a new line of a dozen yellow buses were started in Washington, D. C. These are the property of the Arlington-Barcroft Automobile Co. and ply between northeast Washington and Georgetown and the Virginia towns of Clarendon, Cherrydale, Balston, Fort Meyer, Arlington and Barcroft.

The buses are 1-ton Little Giant trucks, equipped with special bus bodies. The body is painted a bright yellow, with the words Yellow Jitney Line painted in black letters across the sides. It is about the most conspicuous thing in Washington just now, much in contrast with another jitney company, whose buses are not easily distinguished from ordinary cars.

The company operates on a ½-hour schedule, starting 15 blocks east of the Capitol and going straight west to Georgetown, which is something more than 30 blocks west of the Capitol, and then crossing the river at Georgetown to reach the Virginia points. It competes with the street railway company in the matter of charge for carrying passengers, the fare ranging from 5 cents to 25 cents a round trip, which is the fare to Barcroft, the farthest point.

One of Washington's yellow jitney buses

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ests should be hung up or hampered indefinitely for lack of trucks. As I have said, the question of some restrictions has been raised tentatively by a few firms, but no concerted action has yet been taken.

The electric vehicle movement continues to make fairly satisfactory progress, especially when applied to passenger transit in large towns and for municipal purposes generally. Central station engineers are working very hard to further the movement and lose no opportunities of commending the electric truck to public bodies, and especially those where the electric generating stations are owned by the municipality. So far as figures are concerned the cost for current is based on a charge of 2 cents per kilowatt-hour.

Quite a number of Baker electrics have been introduced here by the English agents—Wolseby Motors, Ltd.—and several are employed at one of the largest armament works for purely local haul-

## Our London Letter

**By R. Douglas-Vickers**

(Continued from page 16)

age purposes. I hear satisfactory accounts of their working.

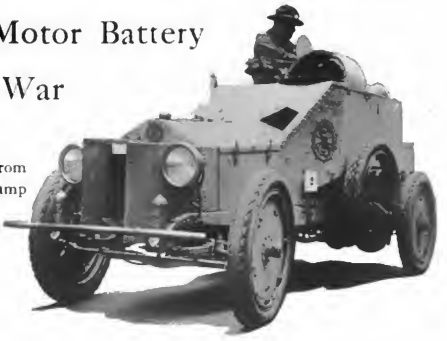
From a correspondent in Copenhagen the news reaches me that since the Germanic armies drove the Russians out of Galicia, and as a consequence recaptured the oil wells, the threatened severe shortage of gasoline in Germany has been staved off for the present. The best opinion inclines to the belief that the great struggle which was waged so successfully in Galicia was undoubtedly waged for supplies of motor spirit and other oil fuels.

The Germans have been making use of a variety of substitutes, such as benzol and alcohol, and there can be no doubt that they have done so with great success. American users can scarcely realize the problem which is involved in the fuel supply for European motorists, and particularly for commercial vehicle users. Kerosene expect in a few special cases has not been anything like the successful alternative to gasoline which at one time it was hoped it would prove.

If I might make a suggestion to those firms who are sending or contemplate sending trucks over to the British market, it would be this: Be sure that they are fitted with a tube type of radiator, as few users here will have anything to do with the honeycomb variety. It may be merely prejudice, or anything else that one likes to call it, but the fact remains that a driver always likes to feel that an accident to two or three tubes of his radiator is not likely to have any serious consequences. Motor trucks here have often to run long distances away from their depots, often as much as 200 to 300 miles, so that everything that an owner believes makes for reliability is held to justify its adoption.—R. Douglas-Vickers.

# America's First Motor Battery Plays at War

### Fifteen Vehicles Make Trip From Gotham to Citizens' Training Camp



Above, fully-armored Cadillac on the march, showing driver's conning tower, steel disk wheels, protection over radiator, spare tires and tackle carried at side of body

OVERLAND from New York City to Plattsburg, N. Y., a contingent of fifteen motor vehicles, mostly trucks, constituting the first motor gun troop organized in this country, made the trip in 4½ days to attend the business men's training camp now in session in Plattsburg.

The troop, under the command of Captain Raynal C. Bolling, left Squadron A armory, Ninety-fourth street and Madison avenue, shortly after 10 o'clock Saturday, August 7, most of the cars checking in at Plattsburg Wednesday, August 11.

It comprised one armored car with a revolving gun on it, two armored motor trucks, three large ammunition transport trucks trailing standard U. S. army limbers and 3-inch field guns, one searchlight truck, one ambulance, one officers' car, and sundry other motor trucks for transport work.

The troop comprises business and professional men of New York City and will

Left, Mack armored truck with 3-inch field gun and limber in tow. The outfit is manned by regulars from an artillery regiment and in charge of Captain R. C. Bolling

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Autocar searchlight truck, followed by Garford escort truck. Note radiator of auxiliary power plant on Autocar to operate generator, also rapid-firing gun on Garford tailboard. The body is replete with clever contrivances

be in service 4 weeks from August 10, on which date the military camp was officially opened.

One thousand and seven lawyers, doctors and other business men are at the Plattsburg camp to receive instruction from the regular army officers. Major-General Leonard Wood is in supreme command and Captain Halstead Dorey, U. S. A. senior aide to General Wood, with a corps of West Point subordinates is in actual command.

### Uncle Sam's First Experience

The troop was organized to conduct experiments in motor-transported machine gun units. No experiments of this kind have ever been conducted by the United States army or the National Guard because no funds or opportunities for such experiments have been provided.

The European war has demonstrated the importance of machine guns. In the United States army four to six machine guns have been considered sufficient for a regiment of 1,000 men, but the war has shown, many military experts believe, that there should be at least twenty-four machine guns to each regiment. Moreover, it is essential, they point out, that these machine guns, with their crews, ammunition and equipment, should be capable of rapid movement for considerable distances.

In the United States army machine guns are packed on the backs of horses or mules and 25 miles is the maximum distance they can cover in a day. The guns, crews and ammunition can be transported the same distance in 2 or 3 hours in motor trucks, and Captain Bolling's troop hopes to make even better time with its outfit.

A record will be kept of the movements of the troop from the time it left New York City until it returns, a month hence. An exhaustive report of its experience will be forwarded to the War Department.

Funds for the maintenance of the troop have been contributed by Judge E. H. Gary, George W. Perkins, J. P. Morgan, Brown Bros., Potter, Choate & Prentice, and White, Weld & Co., while the motor truck equipment was furnished by various motor car manufacturers.

In charge of mechanical instruction is Captain William J. Smedberg, Jr., second regiment U. S. Cavalry, the machine gun expert of the United States army.

The vehicles which comprise the troop, some of which are illustrated on this page, do not constitute a complete outfit for a motor battery, but are more or less in the nature of samples to enable the army officers to determine the capabilities of the different classes of machines and will give the attendants at the camp practice on motor military equipment.

### Armored Car Has Crossed Continent

The armored Cadillac is on a passenger car chassis, although it might easily be on one of a dozen makes of 1,500-pound to 1½-ton commercial vehicles on pneumatic tires. It belongs to the Northwestern Military Academy, Highland Park, Ill., and had just completed a tour from Chicago to San Francisco in the company of eight other Cadillacs belong-

Morton worm-driven, four-wheel-driven 6-ton tractor-truck dragging a field gun unit—the largest vehicle in the troop

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ing to the school when it was returned to New York to be sent to Plattsburg.

It can attain a speed of 40 miles an hour and is equipped with a revolving gun turret. The two armored trucks are a 1-ton worm-driven Mack and a 1½-ton worm-driven Garford, respectively, each of which mounts a 1-pound rapid firer on its tailgate, and machine guns.

### Special Truck Equipment

Of the three larger trucks one is a Morton four-wheel-driven vehicle and another one of the new series AC Mack 3½-tonner, which as yet is an experimental job. These trucks are armored with special Harveyized steel and besides trailing an artillery limber and 3-inch field piece, each carries two guns in the truck body. The armor plating is removable and may be set up to protect the gunner in the field or elsewhere. Each of these three carries 18,000 rounds of machine gun cartridges, 1,800 rounds of 3-inch shells and 500 rounds of 3-inch shrapnel.

The searchlight, ambulance and officers' cars, respectively, are the same Autocars which have been performing at various other manoeuvers and trials recently, notably the New York National Guard encampment at Peekskill, N. Y., last month.

The only truck belonging to the regular army announced so far is the White wireless truck which was delivered to the U. S. Signal Corps last spring. It did not accompany the troops from New York, however. Other motor equipment at the manoeuvers consists of two motorcycles and two aeroplanes.

Armored Mack transport truck of 1-ton capacity, mounted on pneumatic tires. Note suitcases in the body and tires under the floor

## Heat-treating Results

STRENGTH of steels may be greatly increased, when all other means fail, by heat treatment, as proven by a report of experiments on an axle shaft for a Pierce-Arrow truck conducted by John Younger, chief engineer of the Pierce-Arrow Motor Car Co., Buffalo, N. Y., and reported to the American Society of Mechanical Engineers at its spring meeting, June, 1915, in Buffalo.

The shaft in question was a splined one, used in the floating rear axle of the Pierce-Arrow 5-ton truck. These shafts in early models gave trouble in some services by breaking, so that tests were conducted to learn the cause and remedy. First it was found that the effective diameter of the shaft was not the overall diameter, but that through the bases of the splines.

An attempt was made to strengthen the shaft by increasing the number of splines from six to twelve, each one-half its original depth succeeding in an increase in strength of 28 per cent, but even this was not enough. An increase in overall diameter was impossible owing to the design of the rest of the axle, and so heat-treatment was resorted to. The result was so satisfactory that not one of the improved shafts has ever broken.

A limited edition of this paper is for sale by the American Society of Mechanical Engineers, 29 east Thirty-ninth street, New York City.

The first glimpse of the new 3½-ton Mack, on the march with a field gun unit followed by the big Morton. The entire truck is of steel and heavily armored. The truck itself is armed with smaller guns

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# Dump Bodies for Coal and Building Material

## Stilt, Hand-operated Hydraulic Hoist and Pivoting Types

### Hand-power Hydraulic Hoist on 10-ton Trailer

DUMPED by means of a hand-operated hydraulic hoist mounted on the trailer frame, the 10-ton steel coal body used by George Lill & Co., Chicago, in connection with a three-wheeled Knox tractor, is one of the first examples in which the dumping gear is entirely separate from the tractor. This permits the trailer to be hauled to any point, jacked up and dumped while the tractor returns to the plant for another loaded trailer.

The trailer frame is made of heavy I-beam sections with a conventional fifth-wheel arrangement at the forward end. The wheels are fitted with bronze boxes, 60 per cent of the total weight being carried thereon and the remaining 40 per cent on the tractor.

The body is rectangular in shape except for a slight cut-away on each side at the bottom and has one side chute on either side and a tail gate at the rear. The bottom of the body is carried on seven crosswise I-beams which in turn are carried on top of longitudinal I-beams which fit between the trailer frame when the body is in its horizontal position. The weight of the body and the coal is transmitted to the trailer through the crosswise I-beams which rest upon the longitudinal portions of the trailer frame, the lengthwise I-beams on the bottom acting solely as stiffeners.

The hand-operated hydraulic hoist is mounted on trunnions at the forward end of the trailer frame. It consists of a vertical cylinder with a piston carrying an extended piston rod at the end of which are mounted two steel pulleys. Two ropes fastened to the front end of the trailer frame pass over these pulleys and are connected with the longitudinal I-beams on the bottom of the trailer body.

In operation, as the piston of the hoist is forced outward by means of pressure produced by a hand-operated gear pump carried on the left side of the trailer frame, the body is elevated, the hydraulic cylinder slanting backward about its trunnions as a center.

The tail gate is a gate within a gate, the large portion being of the same size as the rear end of the trailer body. This is fastened to the end cross member of the body by four hinges, two at the top and two at the bottom. The smaller portion of the rear gate is approximately one-half the size of the whole and is pivoted at its top ends to the large portion.

When backing up under a loading chute which is lower than the top of the body, both portions of the gate can be made to act as a unit, dropping to a horizontal position on the two lower hinges.

When depositing the load at the door of the customer, the large portion of the tail gate is hinged at both top and bottom and the small portion allowed to open about its pivoted top, thus permitting the coal to flow out without recourse to shoveling from the top of the load. The tail gates are released by hand by means of a catch and a horizontal rod along the right side of the body.

This body was manufactured by Jacob Press' Sons, Chicago. It is shown in both its loaded and dumped positions in the illustration at the bottom of this page.

### Stilt-Type Rear-Dump Bodies for Coal

OF the elevating, rear-dump type, Lally coal bodies, made by the Lally Commercial Body Co., Everett, Mass., are offered in either wood or steel in capacities of from 2 to 5 tons. The type shown in Fig. 3 carries 2 tons and was designed especially for Autocar chassis, although it may be used on other makes as no levers extend below the frame to interfere with the gearset or any portion of the power transmission line.

The body is supported on two sets of bent arms mounted on a subframe carried on top of the truck frame. Each set is made up of two members, one on each side of the truck frame and joined by cross braces. One set is pivoted at the rear end of the subframe with the other end connected with a shaft having rollers at each end that move longitudinally under the bottom of the body in metal U-shaped brackets. This set is called the elevating one because it enables the body to be raised.

The second set, which merely acts as a stabilizer, is like the first, made of channel irons, and is pivoted to the elevating set at the midpoint of its arms by means of bolts through each, thus forming a large X when elevated. The rear ends of the arms of this set are pivoted to the bottom of the body at points near the rear end and the forward ends slide in metal grooves on the subframe. On the underside of the elevating set there is connected a second framework made up of two jointed channel-iron legs with rollers on their lower ends. These rollers are mounted on a crosswise shaft inserted through the lower end of the arms. Around this shaft is wound one end of a chain the other end of which is wound around a drum placed between the sides of the subframe at the rear. As this drum is revolved by means of a hand crank operating through a train of gears alongside of the subframe, the chain is wound up, thus pull-

FIG. 1—Two views of the 10-ton Knox tractor and trailer equipment used for coal delivery by George Lill & Co., Chicago, in which the body is dumped by means of a hand-operated hydraulic hoist carried on the trailer frame. This is one of the first examples in which a dumping gear of this kind has been mounted entirely on the trailer, which permits the latter to be hauled to any point, jacked up and dumped while the tractor returns to the plant for another loaded trailer

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ing the framework connected with the elevating set of arms from the front to the rear and exerting enough pressure upon the latter to force them upwards, thus elevating the body.

In dropping the body the elevating set of arms becomes parallel with the subframe, and the jointed framework connected therewith folds up like a jack-knife, with both halves dropping into a horizontal position.

The body may be elevated by hand through a train of gears or by a mechanical device driven from the truck motor and consisting of a worm and gear. When the hand-operated device is used, the body is lowered by removing the crank handle and throwing out the ratchet on the pinion of the gear train. Its speed of descent is controlled through a brake mounted on the same pinion. When the power-driven device is used, the body is driven both up and down, the irreversibility of the worm acting as a brake on the descent.

With the hand-elevating device the body may be raised by one man in approximately 4 minutes and lowered in 10 seconds. When equipped with a power hoist, it may be raised in 45 seconds and lowered in approximately half the time. The angle of the body when dumping is 30 degrees.

The inside length of the body is 8 feet 5 inches; the width, 5 feet 5 inches, and the height of the sides 26 inches with wing boards 13 inches in height. The bottom of the body

Fig. 2—Type of wood box body reinforced with steel manufactured by the Senderling Mfg. Co., New York City, shown in its loaded position

is 3 feet 8 inches above the ground when in its horizontal position and the overhang aft of the rear axle is 3 feet.

The bottom of the tail gate, which may be of either the hand-opened or automatic types, as desired, is approximately 5 feet from the ground when the body is elevated to its highest point.

The body shown in Fig. 3 is made of an oak frame, sheet steel sides and a steel bottom reinforced with planking. This method of construction provides a body which is strong and at the same time comparatively light. All-steel bodies of the same type can be furnished, however, if desired.

The tail gates on these bodies are pivoted at their tops and may be lifted out if necessary. They are also fitted with scuttle doors for chuting and basketing the coal or coke.

Each body of this type carries with it as standard equipment, two struts or sprags to be used as supports at the rear end for the purpose of preventing excessive weight being thrown on the rear springs when the body is elevated. These struts are made of oak, 2 inches square.

### Heavy-Duty Contractors Bodies

BOX bodies, made of wood, reinforced with steel and designed especially for use by building contractors are made in sizes of from 1 to 3 tons capacity by the Senderling Mfg. Co., New York City. All are of the rear-dump

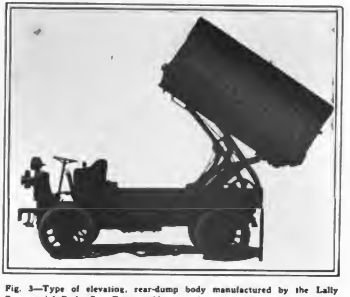

Fig. 3—Type of elevating, rear-dump body manufactured by the Lally Commercial Body Co., Everett, Mass., and designed especially for Autocar chassis, although it may be fitted to other makes if desired. It may be operated either by hand or by mechanical means, according to the desire of the purchaser. Note the wooden struts or sprags used at the rear for the purpose of preventing excessive weight being thrown on the rear springs when the body is elevated

type and are mounted on a metal subframe placed on top of the truck chassis. The rear ends of the subframe are bent downward on a slight curve. The body, which is mounted on the subframe in such a position that a small backward movement causes it to pivot, slides down the bent ends of the frame until it touches the ground.

It is prevented from leaving the frame by means of two steel members on each side, one an angle-iron and the other a slotted flat iron, pivoted to the bottom of the body at two different points. The forward ends of these members are constrained to move longitudinally in a U-shaped lug bolted to the side of the subframe with the closed part of the U at the top. A bolt is inserted through the lower end of the lug on which is pivoted a sleeve in which the forward end of the angle-iron member slides. The bolt is also in the slot of the second member and bears against the front end of the latter when the body is completely dumped.

The body is brought back to its horizontal position by means of a rack on the bottom at the center and a pinion mounted on a crosswise shaft at the rear of the subframe and operated by a hand lever.

When in its horizontal position the body is held in place by means of two chains fastened to the rear end of the driver's seat with hooks dropped into eye-bolts on the front of the body.

Fig. 4—Another view of the Senderling contractors' body, showing it in its dumped position

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## FOR QUICK LOCAL DELIVERY

### Motorcycle Carriers or Tri-cars For Special Fur Deliveries

To the Editor, COMMERCIAL VEHICLE: We will appreciate your advice regarding a quick delivery car for the delivery of small parcels. We have in mind something on the order of a three-wheeled motorcycle with a capacity of 100 to 200 pounds to be used mostly in the immediate vicinity of our store at Fifty-third street and Fifth avenue, New York City, and occasionally for single long trips. You may be able to suggest something more suitable and also inform us of the most reliable makes in this line.—W. F. Prausa, treasurer, Revillon Freres, New York City

You are probably correct in assuming that the motorcycle parcel car will prove the most economical and convenient for the above class of work, wherein speed is a consideration, although something in the way of a light delivery car might also be adapted.

Whether the light delivery car or the motorcycle vehicle is chosen will depend to a great extent upon the price which you wish to pay and the appearance with which you will be satisfied. If your trade is of a fashionable sort, it will perhaps be advisable to invest in a smarter-appearing type for the impression it will make and its advertising value; but if this is not deemed important the motorcycle type might be chosen. It must be borne in mind that the driver of a motorcycle cannot be kept as neat as that of a motor car type, owing to his exposed position and his close contact with the machinery.

Following are the principal makes of motorcycle carriers:

| Make | Manufacturer | Capacity | Price Complete |
|---|---|---|---|
| Harley-Davidson | Harley-Davidson Motor Co., Milwaukee, Wis. | 600 lbs. | $390 |
| Indian | Hendee Mfg. Co., Springfield, Mass. | 300 lbs. | 275 |
| Reading-Standard | Reading-Standard and Co., Reading, Pa. | 350 lbs. | 295 |

Light delivery cars up to 1,000 pounds in capacity are as follows:

| Make | Manufacturer | Capacity | Price Chassis Only |
|---|---|---|---|
| Brasie | Packet, Brasie Motor Truck Co., Minneapolis, Minn. | 600 lbs. | $375 |
| Decatur | Parcel Post Equipment Co., Grand Rapids, Mich. | 800 lbs. | 630 |
| Ford | Ford Motor Co., Detroit | 800 lbs. | 410 |
| Lambert | Buckeye Mfg. Co., Anderson, Ind. | 800 lbs. | 900 |

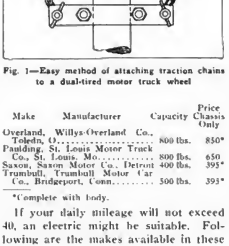

Fig. 1—Easy method of attaching traction chains to a dual-tired motor truck wheel

| Make | Manufacturer | Capacity | Price Chassis Only |
|---|---|---|---|
| Overland | Willys-Overland Co., Toledo, O. | 800 lbs. | 850* |
| Paulding | St. Louis Motor Truck Co., St. Louis, Mo. | 800 lbs. | 650 |
| Saxon | Saxon Motor Co., Detroit | 400 lbs. | 395* |
| Trumbull | Trumbull Motor Car Co., Bridgeport, Conn. | 500 lbs. | 395* |

*Complete with body.

If your daily mileage will not exceed 40, an electric might be suitable. Following are the makes available in these sizes:

| Make | Manufacturer | Capacity | Price Complete |
|---|---|---|---|
| Voltacar | Cyco-lectric Car Co., New York City | 500 lbs. | $585 |
| Ward | Ward Motor Vehicle Co., Mt. Vernon, N. Y. | 750 lbs. | 875 |
| Waverley | Waverley Co., Indianapolis | 600 lbs. | 1,600* |

*Chassis only.

Besides these, any make of motorcycle can be supplemented with a package-carrying side-car or any make of runabout can be supplied with a small package box on the rear deck.

## ATTACHING NON-SKID CHAINS

### Reader Explains Successful Method of Application to Dual Tires

To the Editor, COMMERCIAL VEHICLE: As a suggestion to truck owners who desire an effective, and at the same time convenient method of attachment for non-skid chains to motor trucks, I submit the following, as illustrated in Fig. 1:

Two steel strips, about 1 inch wide and ¼ inch thick, should be bolted to each alternate spoke by means of ½-inch steel bolts. Half-inch holes should be bored in the ends of these strips and fitted with bolts and wing nuts. These plates are to be left permanently attached to the spokes and when slippery roads are reached cross chains are attached to the plates by means of the bolts and wing nuts. By making the chains easy to apply and to remove, they are more likely to be used when needed. —M. F., Pittsburgh, Pa.

## MAKERS OF HAND HOISTS

### Elevating Gears for Trucks Usually Made by Body Builder

To the Editor, COMMERCIAL VEHICLE: Please furnish me with the addresses of some manufacturers of hand hoists.

2—Will you also give me the names and addresses of a few manufacturers of hydraulic hoists?

3—Of dumping bodies?—F. W. Garrett, sales department, Republic Motor Truck Co., Alma, Mich.

1—The COMMERCIAL VEHICLE has no record of any concern which manufactures hand hoists for motor truck bodies exclusively. Most of the companies which manufacture dumping bodies for motor trucks will make up some form of hand hoist to meet the special requirements of the service in which the truck is to work. THE COMMERCIAL VEHICLE published a list of the body makers which it has on record in the issue of July 1, 1915. This list, while not claimed to include all of the body builders in the United States, contained at least one or more builder in practically every large city in the country. Among the companies listed which make dump bodies elevated by means of hand-operated hoists are the following:

| Name of Maker | Address |
|---|---|
| Auburn Wagon Co. | Martinsburg, W. Va. |
| Duffey Bros. Motor Truck Co. | San Francisco, Cal. |
| Fitzgibbon & Crisp Wagon Co. | Trenton, N. J. |
| Honkins Mfg. Co. | Hanover, Pa. |
| George Irving Co. | New York City |
| Lally Commercial Body Co. | Everett, Mass. |
| Littleford Bros. | Cincinnati, O. |
| Lynch Mfg. Co. | Hammond, Ind. |
| George B. Marx | Brooklyn, N. Y. |
| Monohan Vehicle Co. | Providence, R. I. |
| Motor Truck Body Co. | Detroit |
| New Ideal Wagon Wks. | New York City |
| Jacob Press' Sons | Chicago |
| Frederick Roeder | Brooklyn, N. Y. |
| Sebastian Wagon Co. | New York City |
| Sonderling Mfg. Co. | New York City |
| Shadholt Mfg. Co. | Brooklyn, N. Y. |
| Variety Mfg. Co. | Chicago |
| Thomas Wright Co. | Jersey City, N. J. |

2—The Wood Hydraulic Hoist & Body Co., Detroit, is the only concern of which THE COMMERCIAL VEHICLE has record which makes hydraulic hoists for motor truck bodies exclusively. The Meisel Press Mfg. Co., Boston, Mass., also manufactures a truck body hoist, but of what type is not known at this writing.

3—See No. 1.

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## A Lighter Reo Truck

RESPONDING to the demand for a lighter capacity of truck, the Reo Motor Truck Co., Lansing, Mich., manufacturer of the Reo 2-tonner, has produced a 1,500-pound delivery vehicle. It is of orthodox type excepting in the location of the fuel tank and the design of the driver's cab.

It has its motor under a hood, similar in form to that used on Reo passenger models, and drives by bevel gears. Pneumatic tires are used all around, all the same size. It is regularly equipped with the Remy ignition, lighting and starting system, a speedometer and mechanical horn.

It outlines as follows:

| | |
|---|---|
| Capacity | 1,500 pound |
| Price, chassis | $1,600 |
| Wheelbase | 120 inches |
| Tires, front | 34 x 4½ |
| rear | 34 x 4½ |
| Drive | Bevel |

The motor is suspended on a four-point sub-frame, and is of Reo manufacture. The gearset is also mounted on the sub-frame amidships. Details of the motor follow:

| | |
|---|---|
| Bore | 4½ |
| Stroke | 4½ |
| S. A. E. horsepower | 27.3 |
| Speed, m. p. h. | 18 |

It is cast in pairs, with the characteristic valve arrangement of Reo motors, the inlet valve in the head and the exhaust at the side. A centrifugal pump cools the motor with a square-tube radiator in front. This radiator, like on the passenger models, has a small visor at the top to give the V effect, but is set slightly farther in advance of the front axle to shorten the wheelbase for a less turning radius, the new truck being able to turn in 45 feet.

A Johnson carbureter is controlled by both hand and foot throttles and is fitted with a dash adjustment. It is fed by gravity from the cylindrical fuel tank on the cowl dash.

Ignition is supplied by the Remy lighting generator in connection with the lighting battery. The lighting system comprises two headlights with dimmers, an instrument light on the dash and a tail light. The generator is mounted on the engine and the starting motor on the front end of the gearset. The battery is of 100 ampere-hours capacity, the system being of the 6-volt type.

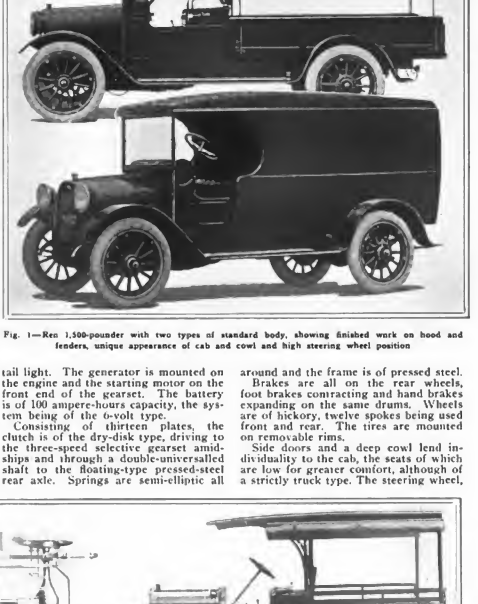

Fig. 1—Reo 1,500-pounder with two types of standard body, showing finished work on hood and fenders, unique appearance of cab and cowl and high steering wheel position

Consisting of thirteen plates, the clutch is of the dry-disk type, driving to the three-speed selective gearset amidships and through a double-universalled shaft to the floating-type pressed-steel rear axle. Springs are semi-elliptic all around and the frame is of pressed steel.

Brakes are all on the rear wheels, foot brakes contracting and hand brakes expanding on the same drums. Wheels are of hickory, twelve spokes being used front and rear. The tires are mounted on removable rims.

Side doors and a deep cowl lend individuality to the cab, the seats of which are low for greater comfort, although of a strictly truck type. The steering wheel,

Fig. 2—Hanger 1,000-pound delivery vehicle, plan and side views showing standard body type. Note compact construction

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Fig. 3—Headley's chain-driven four-driver, showing both axles slightly turned

on the left side, is set unusually high, which makes it easy for the driver to leave and resume his seat. The instrument board is set on the edge of the cowl, directly beneath the tank, where it is within easy reach from a sitting posture. The levers are in the center.

Although the chassis alone sells for $1,000, for ordinary use it will probably be an economy to buy one of the standard body types illustrated on this page. The open express type with a canopy top sells for $1,075, the panel slightly higher. An unusual feature in a commercial model is the touring car type of fenders and running boards fitted. These extend all of the way back and are well winged to the frame at the sides.

## Hanger ½-tonner, $785

ATTESTING to the demand for lighter delivery vehicles is the large increase in trucks of 1,000 pounds capacity, to which number the Hanger, made by the C. F. Hanger Co., Cleveland, O., is a late recruit. The Hanger vehicle is interesting for one thing, because of its price, $785 complete, no chassis price being quoted.

For this sum one gets a pneumatic-tired vehicle of catholic form with a light express body equipped with a canopy top. It is provided with a unit power plant under a conventional hood, and fitted with a single-unit electric starting and lighting system. The characteristics of this new vehicle are:

| | |
|---|---|
| Capacity | 1,000 pounds |
| Price, complete | $785 |
| Wheelbase | 106 inches |
| Tires, front | 32 x 3½ |
| rear | 32 x 3½ |
| Drive | Bevel |

The motor is a Lycoming, mounted directly on the mainframe. Its main features are:

| | |
|---|---|
| Bore | 3½ inches |
| Stroke | 5 inches |
| S. A. E. horsepower | 16.92 |
| Speed, r. p. m. | 2,000 |
| m. p. h. | 30 |

It is frankly a high-speed motor, and is unrestrained by a governor, the vehicle being mounted on pneumatic tires and built for fast work. The motor is cast in block with a detachable cylinder-head block, the valves being to the right.

Thermo-syphon circulation cools the motor and a cellular radiator, the water. The carbureter is a Carter or Marvel, on option, and is controlled by both hand and foot throttles.

A peculiarity of the control is that the throttle lever, on top of the steering wheel also, advances the spark. While it may be pointed out that this reduces the flexibility on high gear, necessitating a drop into intermediate sooner than would be the case could the throttle be opened and the spark left retarded, it at least offers greater flexibility than a fixed spark without extra complication of control, and it is by no means certain that the ability to negotiate hard going in high is distinctly desirable on a commercial vehicle, at least.

Atwater-Kent ignition is employed, drawing current from the lighting battery. The starting and lighting system is of the single-unit type, mounted on the left side of the engine and driving through the timing gears. It operates at 12 volts pressure.

Drive is through a cone clutch and three-speed selective gearset to the bevel-driven three-quarter-floating rear axle by a torque-tube-inclosed shaft with one universal, propulsion being through the rear springs.

Three-quarter-elliptic rear springs are fitted to a pressed-steel frame. Brakes are on the rear wheels, the foot brake external and the hand brake internal. Twelve spokes are contained in each wheel, five demountable rims being regularly supplied. The steering wheel is at the left and the levers in the center. With a panel body the price is $825.

## Hoadley All-drive Truck

HOADLEY BROS., Gosport, Ind., are experimenting with a four-wheel-driven-and-steered motor truck of novel design, which, although not actively on the market, is interesting. Chief among its remarkable characteristics is chain drive, each wheel being chain-driven, and fifth-wheel steering.

The truck consists of a standard type of frame with a standard type of motor mounted under a hood forward of the dash. At both front and rear are fifth wheels beneath which are steel subframes which carry the springs and axles. On these sub-frames the jackshafts are mounted, being driven by jointed drive-shafts. These driveshafts are in turn driven by spur gears connected with a shaft attached to the gearset. A rack-and-pinion device controls the turning of the fifth wheels.

## R-S Three-wheeled Parcelcar

NOT A MOTORCYCLE, although using the same engine as the Reading-Standard two-wheeler, the three-wheeled Reading-Standard parcelcar, built by the Reading-Standard Co., Reading, Pa., is designed for fast delivery of light loads. It is built on a pressed steel frame with four springs of good length, those in the rear semi-elliptics. The load container is about balanced over the front axle, the motor is located beneath the driver's seat and the single rear wheel takes the drive. The rear wheel is centrally located. The vehicle has a load capacity of 350 pounds and sells for $295.

The frame is V-shaped and carries only the package box, controls and driver's seat, the power plant being carried by a sub-frame pivoted to the mainframe at two points under the dash and rigidly attached to the rear axle. The driver sits on a bucket seat and steers with an inclined wheel.

The motor is a V-type two-cylinder air-cooled machine of 10 rated horsepower, the valves being on the right side and side by side. The carbureter is placed in the V and is a standard Schehler motorcycle type. It is fed by gravity from a cylindrical tank mounted on the dash, which tank also has an oil compartment.

Fig. 4—Commerce 1,500-pound delivery vehicle in two styles of superstructure, showing pneumatic tires, closed running boards and truck type of radiator

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City Coal Co.'s jack-of-all-trades electric truck delivering coal and building materials in Hartford, Conn.

Ignition is supplied on the single plan by a Bosch motorcycle magneto of the waterproof type. Both spark and throttle are controlled by levers on top of the wheel. Lubrication is by splash, gravity feed, a valve on top of the tank controlling the supply. A hand pump is mounted on the tank also, for emergency use.

Transmission from the engine to the wheel is by means of an Eclipse two-speed clutch and a single chain. The motor is started by a hand crank on the right side, connected with the engine by a chain and sprocket and over-running clutch.

Control is by two levers, one for the clutch and the other for the change-gear, with pedal control of the brake and the clutch.

The front axle is of the motor car type with side-car wheels. Tires are 28 by 3, clincher. Regular equipment is with an open package box forward, 38 inches long, 32 inches wide and 23 inches high, the whole vehicle being enameled brown.

## Longer Commerce Model

FEW CHANGES have been made in the design of the new series of Commerce 1,500-pound delivery chassis by the Commerce Motor Car Co., and the company will continue its former practice of specializing on one model. The new series, known as Model N, superseding Model S, differs from the former model in the wheelbase, which has been lengthened from 107 inches to 120 inches and the tires changed from 33 by 4 to 34 by 4, non-skid tires being regular equipment on the rear hereafter.

The Commerce vehicle is a bevel-driven model with a 3½ by 5 motor cast in block and driving through a cone clutch and standard gearset to a bevel-driven rear axle at a reduction of 6 to 1 on high. Its features are a cast-tank vertical finned-tube radiator and rear springs 50 inches long and 3 inches wide which take propulsion.

## Electric Coal Delivery

QUITE diversified is the service for which a two G. V. electric truck is used by the City Coal Co., of Hartford, Conn. This company, one of the largest in the Nutmeg capitol, and has had much experience with all types of gasoline vehicles. It installed the electric a few months ago. The car is used to deliver coal, cement, lime, hair, brick, sewer pipe, in fact, all kinds of builders' supplies. The driver and one man handle all the loads. The truck is driven about 40 miles a day and goes all over the city and throughout the surrounding territory. It is operated under the Edison battery service system of the Hartford Electric Light company.

That is to say, the concern purchased the chassis only. The battery is renewed once or twice a day on a fixed charge. The owners are so well pleased with the installation that they are considering seriously the purchase of a 5-ton unit. The one big feature is the freedom from mechanical trouble. The company maintains its own garage for the gasoline trucks. This is the first electric to be operated by the City Coal company. The performance has been closely observed by other coal companies using gasoline vehicles only.

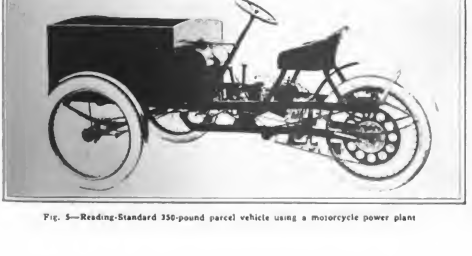

Fig. 5—Reading-Standard 350-pound parcel vehicle using a motorcycle power plant

## The Case for Brick Roads

BOTH the Motor Truck Club of America and the National Team & Motor Truck Owners' Assn. have gone on record against both asphalt and wood block pavements and more or less in favor of granite block paving for city service. Neither organization has gone into the question of country roads deeply, and yet motor trucks are operated on rural highways to a considerable extent.

In Bulletin 246 of the Office of Public Roads, U. S. Department of Agriculture, the brick road is treated. This book goes deeply into the technical features of the construction of the road, selection of materials, items of cost, etc., summing up the advantages and disadvantages of brick roads as follows:

"They are durable under practically all traffic conditions; they afford easy traction and moderately good foot-hold for horses and they are easily maintained and kept clean.

"The principal disadvantage is the high first cost. The defects which frequently result from lack of uniformity in the quality of the brick or from poor construction are usually to be traced indirectly to an effort to reduce the first cost or to a popular feeling that local materials should be used, even when of inferior quality."

Issue may be taken with the department, by some, in its advocacy of the sand cushion beneath the bricks, which is one of the chiefest causes of unevenness and consequent trouble, but on the whole the work is issued at a particularly opportune time for the consideration of those interested in roads for motor trucks, now that granite block city pavements are receiving attention.

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The Knox tractor of today encounters the animal tractor of the ancients in rural Ohio with mutual astonishment

# Unusual Truck Types for Specific Purposes

## Tractors of Yesterday and Today Compared

QUITE unawares the photographer who snapped the above scene demonstrated the great strides that have been made in rural transportation in the last generation: The latest form of commercial haulage and the most antiquated thrown together by chance.

The tractor is a Knox, used by a road contractor at Wadsworth, O., to haul five-trailer trains of crushed stone. The oxen are shorthorns, hauling a slow-going agriculturist of other days.

In these days when the yoke of oxen is a curiosity and the motor truck and tractor is commonplace, and when transportation discussion is principally limited to speculation on whether the motor truck or the horse is most efficient in certain lines, the stubborn refusal of this old fellow to adopt horses for any purpose whatever is amusing—or would be were it not such an excellent parallel to the attitude of many horse users toward trucks.

The tractor is used on a haul of 3 miles each way, 1 mile of which is dirt as shown above, and 2 miles paved as in the lower illustration. The pay load averages 18¼ tons, which must be hauled up a 4 per cent grade each trip. Each round trip takes 1 hour. On May 30, 90 tons were hauled in 10 hours, 18 gallons of gasoline being consumed.

An ox team can amble about 15 miles a day, and could haul one of the five trailers drawn by the tractor. It can make 2 miles per hour, so that each yoke would take 3 hours to made the round trip with one wagon. The tractor hauls five times as much in one-third the time. In a day of 10 hours it does the work of twenty-five yoke of oxen.

## New Searchlight Truck

DEVELOPED by the Autocar Co., Ardmore, Pa., a new type of military searchlight truck has recently been demonstrated to government officials at the League Island Navy Yard, Philadelphia, to the engineering department at Washington Barracks, D. C., and to the Maryland State Militia.

In a test at League Island it threw a bright beam 1,500 yards. The chassis is a standard Autocar upon which is mounted the searchlight equipment in lieu of a body. An Autocar engine is coupled direct with a 7-killowatt direct-current Westinghouse generator, which operates at 1,200 r. p. m., delivering 56 amperes at 125 volts. A Pierce governor is applied to the engine to maintain its speed constant.

Separate fuel and cooling systems are applied to the auxiliary motor. The searchlights run on tracks and are spring-mounted to protect their delicate mechanism from vibration and shock. Two wire-wheeled handtrucks are provided for the operation of searchlights at a distance from the truck. Four reels carrying 1,350 feet of cable are mounted on the truck. The searchlights, of 5,000 candle-power are 14 inches in diameter.

A seat at the rear will accommodate two or three men besides the two on the driver's seat.

Doing the work of twenty-five yoke of oxen

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## The Daschund Truck

W. P. FULLER & CO., the big manufacturing and wholesale paint house with headquarters in San Francisco and branches in other Pacific Coast cities, report that they are getting very satisfactory results in the operation of the new low-wheeled motor truck for delivering their product.

A great deal of the horse hauling in San Francisco is done on low-hung wagons and loading platforms are built to accommodate them.

W. P. Fuller & Co. put it up to the Kelly-Springfield Motor Truck Co. to give them a machine with the body set low and the Springfield engineers accomplished it by mounting the regular Kelly chassis on wheels of 30-inch diameter with 6-inch tires. The springs are flattened a little, the gear-ratio is higher, and these and the wheels are the only special features.

Most of the loading at Fuller's shipping room is done off the ground, and packages of lead, oil, etc., are handled up to 1,200 pounds to the package. Two men accompany the truck. The tires are special Firestones, pressed on, and the Firestone branch is equipped to give the necessary service and replacements.

Autocar military searchlight truck on the march

New special low-hung Kelly truck used by W. P. Fuller & Co. in San Francisco for carrying heavy packages of paint, lead and oil. Many of the San Francisco horse-drawn wagons are low-hung, so this type is especially suited to conditions existing in that city

## Good Roads Develop Cities

ENCOURAGEMENT is being given to the development of good roads in the hills in the vicinity of Springfield, Mass., in order to promote the use of motor trucks and buses in preference to trolleys. Hampden county contains a considerable rural population which markets in Springfield and yet is without adequate transportation facilities. The *Springfield Republican* comments on the subject as follows:

"Of the many activities of the Hampden County Improvement Assn., the new movement for good roads is likely to prove one of the most useful. Trolley legislation is still far off and if trolleys should be built they could not even give the general development that is sought. The importance of the good roads movement thus becomes the more accentuated and it is clearly seen that the wisest policy for all to adopt who are interested in the upbuilding of rural Massachusetts is to unite in supporting a broad scheme of roads of such a quality as to bring about a development of motor trucking.

"Springfield is the big market for Hampden county. Are all the farms within what should be an easy hauling distance of the city reachable by good roads? If they are not, the county loses an asset. The farms near the city and near every market in the state ought to be going concerns. They ought to use up-to-date methods of growing and packing and hauling. The farmers ought to study motor vehicles and see where they could use them to advantage. They ought to invite the motor truck manufacturers to show them what can be done, how low haulage costs can be reduced, in what way communities can unite in acquiring vehicles of a type that an individual might not be able to own."

**A Factory Library** is an important department of the Goodyear Tire & Rubber Co. All the important scientific and trade journals are received and circulated, then filed for general reference. There are thousands of pamphlets and clippings on almost every conceivable subject, touching the equipment and work of the factory departments.

The eyes of the night

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# Accessories for the Truck

## FULLER TRUCK GEARSETS

Of the unit-power-plant type, Fuller gearsets, manufactured by the Fuller & Sons Mfg. Co., Kalamazoo, Mich., are made in one model for trucks of 1½ to 2 tons capacity. It is of the three-speed selective type with center control and may be fitted with either right or left steer. Two brake and gear-shift lever positions are available, one directly above the gearset box and one slightly to the rear enclosed in a housing bolted to the box.

The gear cases are usually furnished in cast iron, but can also be supplied in aluminum if desired. They flare out at their forward ends to inclose clutches of the dry-plate multiple-disk type. The driving clutch disks are faced with long-fiber Rabestos. The clutch is operated by one central spring designed for the purpose of giving a uniform pressure at all points of contact on the clutch facings.

The gears and shafts are of nickel steel, the former having ⅞-inch faces and the later being 1⅞ inches in diameter over the splines.

Ball bearings are used to support both the mainshaft and layshaft, a large double-row Fafnir bearing being mounted in a separate housing at the rear of the mainshaft to take radial loads and thrusts in both directions.

## PAWLING & HARNISCHFEGER ELECTRIC HOISTS

Originally designed for the rapid handling of material in manufacturing plants, Pawling & Harnischfeger electric hoists, made by the Pawling & Harnischfeger Co., Milwaukee, Wis., may also be successfully used for the quick loading and unloading of motor trucks. As the efficiency of a motor truck depends to a great extent upon the time it has to stand idle while being loaded or unloaded, any apparatus which decreases this standing time will increase the earning power of the vehicle.

Fig. 3—Hand-propelled type of P & H electric hoist

The Pawling & Harnischfeger electric hoists, while manufactured in various models with ordinary or magnet pick-ups, designed to run on a monorail system and to carry heavy loads, are offered in two types especially suited for motor truck loading. These are a 1-ton unit designed to be propelled either by a hand chain or by pushing on the load carried, and another type for loads of ½ to 6 tons which is electrically propelled. Both types are mounted on carriages designed to run along an overhead I-beam to transfer the load from the shipping platform to the truck.

Fig. 2—Complete Fuller clutch and gearbox

The hand-propelled type consists of a cast steel frame at the top of which is connected the rolling carriage propelled by means of a hand chain and pulley driving through a train of gears. The lifting motor is mounted at one end of the frame, below the rolling carriage; the rope drum in the center; the train of gears driving the drum at the other end and the multi-speed controller on one side.

The motor is made by the Pawling & Harnischfeger company and especially designed for crane service, being of the moderate-speed type for either direct current from 110 to 600 volts, or from 110 to 550 volts, alternating current. The motor shaft is extended below the drum to the train of driving gears at the other end of the frame which consists of spur gears and pinions. The load brake mounted on the drum shaft is electrically operated so that the load is automatically sustained at all times and can not run down through the carelessness of the operator or interruption of the current, but must be pushed down by reversing the motor.

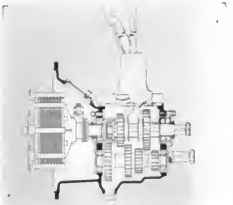

Fig. 1—Section of 2-ton Fuller gearset and clutch

The motor is also provided with a brake of the solenoid type which brings the motor to a prompt stop after the controller has been returned to the off position. This brake has locomotive-type shoes lined with asbestos.

The controller is of the drum type with a large number of speed points. These, with the motor brake, permit of excellent speed control and an accurate spotting of the load at all times. The drum contact fingers and the resistance units are all assembled in a separate frame and are accessible by simply removing the cover. The resistance is made of alloy wire in separate units, any one of which may be readily removed.

When the bottom block reaches the highest position, it strikes a protruding arm attached to a limit switch which interrupts the motor current and brings the motor to a stop by means of the motor brake.

The electrically-propelled hoist is similar in design to the hand-moved type

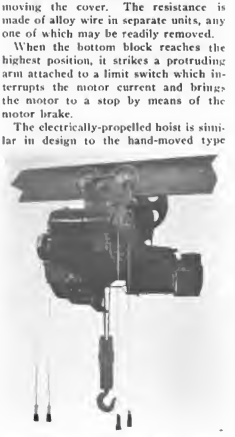

Fig 4—Motor-propelled type of P & H electric hoist

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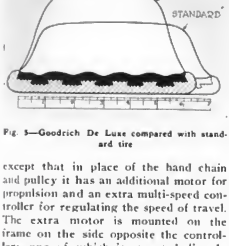


Fig. 5—Goodrich De Luxe compared with standard tire

except that in place of the hand chain and pulley it has an additional motor for propulsion and an extra multi-speed controller for regulating the speed of travel. The extra motor is mounted on the frame on the side opposite the controllers, one of which is mounted directly above the other.

Both types are shown in Figs. 3 and 4.

## CARTER AUTOMATIC GRAVITY FUEL TANK

Positive in operation, the Carter automatic gravity gasoline tank, marketed by the H. W. Johns-Manville Co., New York City, consists of a cylindrical container connected with the main gasoline tank and with a diaphragm pump actuated by the suction and compression in one cylinder of a multiple-cylinder engine. With each suction stroke of the motor, gasoline is sucked from the main to the Carter tank from whence it feeds to the carburetor by gravity.

The diaphragm pump is attached to the bottom of the gasoline container which has a capacity of about 1 gallon. The entire unit is mounted directly on the engine as high as the hood will allow, and in the most convenient position, but isolated from the exhaust manifold in order to avoid heating.

The action of the Carter system is positive and its capacity unlimited because the fuel supply is increased directly in proportion to the increase in the engine speed. For example, the delivery of the fuel is increased from 6 gallons per hour at 300 r. p. m., to 22 gallons per hour at 1,500 r. p. m.

The gasoline container or tank has a stand pipe at its center in which is disposed a vertical rod carrying a cork float. This rod has a spring check valve at the bottom to prevent the suction of the diaphragm pump from sucking gasoline from the Carter tank instead of the main tank. A steel breather ball is carried at the top of the rod in a breather inlet and priming cup.

A sectional view of the device and its method of attachment to the motor is shown in Fig. 7.

## WOODWORTH PUNCTURE-PROOF TIRE

Pneumatic but claimed to be puncture-proof the Woodworth tire consists of a standard type of pneumatic casing on the inside of which a strip of chrome leather is cemented. The leather imparts the puncture-proofness while adding hardly at all to the weight or thickness of the tire. The leather which is used is quite soft so that it does not increase the stiffness of the tire, although tough enough to resist the entrance of nails or other sharp objects. They are illustrated in Fig. 1 and made by the Leather Tire Goods Co., Niagara Falls, N. Y.

## GOODRICH DE LUXE SOLID TIRE

Distinctively new in the way of solid tires for motor trucks is the De Luxe tire just introduced by the B. F. Goodrich Co., Akron, O. The De Luxe tire differs from the usual form of solid tire in that it is higher and not so wide for given capacity. This construction gives the same or a greater amount of rubber in a tire of given capacity, but places the rubber where it will give a greater cushioning effect, according to the argument of the Goodrich company.

Another obvious advantage is that a greater amount of rubber is available as wearing tread than when the tire is of less depth but greater width.

Heretofore the tread depth of a solid tire has been more or less uniform in all sizes of solids, additional tire capacity being obtained by making a tire of greater width, retaining the same depth, building out the wheel in accordance. This depth is usually 2¾ inches, whether the tire is 3½ inches or 7 inches wide.

Fig. 6 — Woodworth pneumatic tire, showing leather strip

In the new tire the same amount of rubber is made into a form calculated to give the ideal mean between capacity and resilence and this same relation of tread depth to width is retained in all sizes, so that the shape of the tire is the same regardless of size.

The claim is made that a 5-inch De Luxe will wear longer than a 6-inch regular, owing to the fact that the rubber retains its vitality longer through being a better cushion.

In a twin, the overall width of the tire is lessened, so that the load may be taken more nearly in line with the spokes, and one of the greatest difficulties which the wheelmaker has to contend with is eliminated. Owing to its greater compressibility, the inner of the twin, if a De Luxe, may be pressed down on a crowned road so that the outer one comes into contact with the road and shares the burden.

Goodrich De Luxe tires are built on wireless bases like other tires, and retain the Goodrich duplex-curve feature which is said to decrease side-wall chipping, and are made to fit all standard wheels in S. A. E. sizes.

**Blue smoke** in the exhaust, which always betokens too much oil in the cylinders, cannot always be eliminated by cutting down the oil feed. Holes drilled in the skirt of the piston will prevent an excess of oil slipping past the rings.

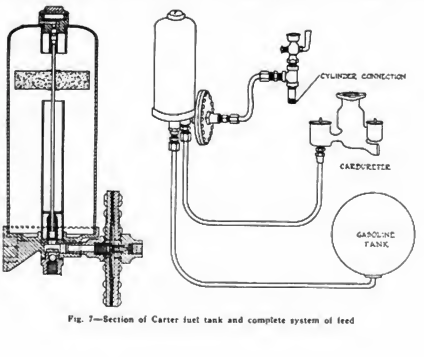


Fig. 7—Section of Carter fuel tank and complete system of feed

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# Men and Makers

**DENBY MOTOR TRUCK CO.,** Detroit, has purchased the old plant of Briggs-Detroiter Co. The former location of the Denby company has been outgrown and the new plant, besides giving better railroad facilities, is larger. The sale, which was made through the Detroit Trust Co. and confirmed by the Federal Court, was for a consideration of $63,500. The property consists of 5½ acres, the factory buildings being on Holbrook avenue and the Grand Trunk railroad.

**Pierce-Arrow Motor Car Co.,** Buffalo, N. Y., is erecting a new warehouse four stories above the ground, 453 by 61½ feet inside. It is constructed of reinforced concrete with mushroom floors, spans being 20½ feet.

**Kosmath Co.,** Detroit, is to move to Sandusky, O., owing to the need of more manufacturing space. The Kosmath company occupies the same building in Detroit as the Columbian Electric Vehicle Co., where both have been cramped for space. They will move together to their new location.

**Autocar Co.,** Ardmore, Pa., is conforming to the movement for more artistic and prominent billboard advertising. In Chicago painted signboards on metal in sizes up to 50 feet in length have been placed where calculated to do the most good. The signs are tastefully gotten up, in some cases with artistic supporting pillars.

**Pacific Metal Products Co.,** Los Angeles, Cal., manufacturer of the Moore truck and agent for the Denby, has been appointed distributing and selling agent for the Ideal farm tractor, manufactured by the Union Tool Co., Torrance, Cal. The first machine offered for open sale was placed in its showroom on July 22.

**Pacific Metal Products Co.,** Los Angeles, which closed an agency contract to handle the Denby truck a month ago, has sold its first carload and has another carload on the way. It won the factory pennant awarded last month to the agency selling the most trucks.

**Mack Motor Truck Co.,** Los Angeles, formerly owned by H. A. Seller and J. A. Stoner, has been taken over by J. A. Stoner. The business will be moved to larger quarters at 1030-1034 South Olive street. The company is agent for Mack, Saurer and Republic trucks.

**Studebaker Corp.,** Detroit, Mich., has established a new district for distribution of Studebaker trucks and cars at Santa Barbara, Cal. This district includes northern Los Angeles county and several other counties, although not the city of Los Angeles itself. L. H. Boydston has been placed in charge.

**Stearns-Knight Auto Co.** is the new name of the St. Louis dealer in Stearns-Knight trucks and cars. Dell D. Brownback remains president and F. A. Conrad has been made secretary and treasurer.

**Edison Storage Battery Co.** plans to transfer its western office from Cleveland to Detroit and will locate in the new David Whitney building. H. L. Davidson, formerly in charge of the service department at the Orange factory, will manage the Detroit branch.

**The Packard Motor Car Co.,** Detroit, has taken over the service station and salesroom of the Boston Packard branch.

**Eclipse Machine Co.,** Elmira, N. Y., has commenced the manufacture of steering gears for motor vehicles. It formerly specialized in accessories and parts for bicycles and motorcycles.

**Timken-Detroit Axle Co.,** at a board meeting recently held, re-elected W. M. Timken president, and promoted H. H. Timken from the office of vice president to that of chairman of the board of directors. Other changes were as follows: A. W. Dennis, formerly second vice president, was made vice president; E. W. Lewis, formerly secretary and treasurer, was made second vice president; Herbert W. Alden was made vice president, retaining his former post of chief engineer; Frederick C. Gilbert was promoted from assistant secretary to secretary; C. W. Dickerson, formerly assistant treasurer, was made treasurer, and W. H. Hutton, Jr., has had his title changed from purchasing agent to director of purchasing.

**Western Tire & Rubber Co.** has purchased 10 acres of land at Akron, O., and broken ground for the construction of a factory three stories in height, 60 feet front and 150 feet deep. The concern, which was organized at Kansas City, Mo., and recently reorganized by M. O'Neil, has a capital of $200,000 and William O'Neil has been made general manager.

**Nuts Not Wine** will be manufactured in the three-story plant formerly used by the Sandusky Wine & Brandy Co., the Brightman Nut & Mfg. Co. having secured it for new quarters.

**Hartford Auto Parts Co.,** Hartford, Conn., is contemplating re-establishment in larger quarters and desires a tract of land 150 by 300 feet or larger.

**Forster Gear Co.,** Columbus, O., reports difficulty in keeping up with orders for steering gears. Besides taking on additional men it is adding to its factory.

**Hess-Pontiac Spring & Axle Wks.,** Pontiac, Mich., is working at capacity and is taking on skilled workers as fast as possible.

**Detroit Pressed Steel Co.,** Detroit, recently experienced great difficulty in securing skilled labor. A representative was sent to Milwaukee, Wis., but there found that the demand of the Wisconsin factories had apparently absorbed the available supply of intelligence.

**H. D. Church** has been appointed assistant chief engineer of the Packard Motor Car Co. For the past 5 years Mr. Church has been truck engineer of the Packard company, the connection with the concern being of 6 years' standing. Previously Mr. Church was connected with the Mercer, Alden-Sampson and Waltham concerns.

**Champion Ignition Co.,** Flint, Mich., will add 18,000 feet of floor space to its plant when the new building now being erected is completed. This will increase the output of AC plugs to 50,000 a day.

**H. T. Wilson,** formerly chief engineer of the Gas Engine & Power Co., Morris Heights, N. J., succeeds H. D. Church as truck engineer of the Packard Motor Car Co., Detroit.

**Lewis D. Kalb** has joined the engineering department of the Kelly-Springfield Motor Truck Co. and Walter C. Guilder has been appointed factory manager. Mr. Kalb, for the past 3½ years has been in the designing and experimental department of the Pierce-Arrow company and had a previous connection with the Garford company, Elyria, O. Mr. Guilder recently left the production department of the Timken-Detroit Axle Co., having previously been connected with the Mack plant before its absorption by the International Motor Co.

**George M. Sherman,** general traffic manager for the Studebaker Corp., is at the Detroit office of the company, having left his South Bend headquarters while his assistant, H. T. Johnson, is taking his vacation.

**Albert Fisher,** president of the Standard Motor Truck Co., Detroit, left for a tour of inspection of Standard agencies and distributors throughout the west and Pacific coast sections. Mr. Fisher does not expect to return until September.

**Frank C. Lindoerfer** has resigned as general sales manager of the Atterbury Motor Car Co., Buffalo, N. Y., and has joined the Bessemer Motor Truck Co., Grove City, Pa., as manager of the Bessemer distributing branch in Buffalo. With Mr. Lindoerfer is Norman B. Harrington, who has been with the Atterbury for the last 4 years. The Bessemer Truck Co., as the Buffalo branch is called, will have all of the eastern territory. Mr. Lindoerfer started in the motor industry 16 years ago with the Haynes-Apperson Automobile Co., Kokomo, Ind., and has been in the business ever since.

**E. W. Spencer** has been promoted to the position of assistant manager of the Kansas City branch of the Studebaker Corp. He leaves the position of manager of the sales promotion department at the Detroit factory.

**F. C. Kenney,** formerly assistant manager of the St. Louis branch of the Studebaker Co., and recently acting as manager of the Memphis, Tenn., branch, has resumed his former duties in St. Louis.

**C. T. Cary** has been made manager of the new San Francisco branch of the Garford Motor Truck Co., Lima, O. Mr. Cary has had 10 years' experience in the motor truck field having begun his career as a designer of Franklin passenger vehicles. As inspection engineer

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he began his first experience with motor trucks in the employ of the General Vehicle Co. He was promoted by the General Vehicle officials to the position of transportation and maintenance engineer, after which he became connected with the Peerless truck department. Resigning from the Peerless company he took charge of the eastern territory of the Federal Motor Truck Co., in the course of which employment he was called on to make several trips to Europe.

**G. H. Dalrymple,** who was formerly with the Speedwell company, has become connected with the Standard Motor Truck Co., of Detroit, as traveling representative in the states of Ohio and Indiana.

**E. C. Hopkins** has left the Boston branch of the Buick Co. to become manager of the Rhode Island branch controlled by Charles F. Thatcher, of Providence.

**Frank W. Post** has been made manager of the New York branch of the F. B. Stearns Co., succeeding the late W. Arthur Lesser.

**George L. Bitting** succeeds E. B. Lausier as eastern representative of the Timken-Detroit Axle Co. and Timken Roller Bearing Co. in the east. Mr. Bitting has his headquarters at Buffalo and covers all territory east of Cleveland.

**George A. Buckbee,** formerly connected with the Fafnir Ball Bearing Co., has been made manager of the Boston branch of the Ahlberg Bearing Co., Chicago, by C. J. Bender, secretary and treasurer, who is in the east making a tour of branch offices.

**A. W. Burdman** has succeeded E. E. McManus as advertising representative of the St. Louis branch of the Firestone Tire & Rubber Co.

**E. I. Welch,** who formerly manufactured the Welch car, has established the Twenty Century Metallic Packing Co., Louisville, Ky. The company will manufacture packing of various sorts at Cincinnati, O., and will have sales offices in Detroit, Mich.

**A. S. Bowser,** formerly secretary of the S. F. Bowser Co., Fort Wayne, Ind., has been transferred to the position of assistant general manager of the Albany office of the concern.

**W. O. Turner,** secretary and director of the Lovell-McConnell Mfg. Co., maker of Klaxon horns, has resigned owing to poor health.

**Wesley DeLano** has taken the position vacated by W. H. Nash as Detroit representative of the Mott Wheel Wks., Utica, N. Y. In connection with the Mott line he will also handle the product of the Jackson Rim Co., Jackson, Mich.

**W. H. Nash,** formerly Detroit representative for the Mott Wheel Wks., Utica, N. Y., has joined the sales force of the Timken-Detroit Axle Co.

**L. O. Stewart & Bros.,** Washington, D. C., coal, wood and ice merchants, are planning a garage with a capacity for fifty trucks, which will have 20,000 square feet of floor space and will cost about $10,000.

**Internal-Gear News** is the title of a new publication which will be issued at intervals by the Internal-Gear Drive Assn., Detroit. The booklet will be circulated among truck engineers, executives and officers of motor truck companies, dealers in motor trucks, etc., and will carry on such features of the propaganda of the internal-gear drive as do not find their way into the columns of motor truck publications. Offers of advertising have been refused.

**Firestone Annual Outing** was held at Silver Lake Park near Akron recently. Employes to the number of 15,000 were present. Barney Oldfield entertained the crowd with some exhibition racing in the Fiat Cyclone and De Lloyd Thompson, the aviator, looped the loop in his aeroplane.

**Directory of Piston Ring Sizes** is the title of a book published and copyrighted by the Burd High Compression Ring Co., Rockford, Ill. This volume contains 123 pages of tables of ring sizes and motors on which they are used. It is divided into three sections, one of which is classified according to all the different sizes of piston rings under which the makes of motor trucks, tractors, motorcycles, cyclecars, engines and passenger vehicles are grouped. Each piston ring size has its code word, by means of which Burd high compression rings may be ordered by telegram. Another section is an index of every make of vehicle or motor showing on what page of the first section the proper ring size may be found. The third section contains a description of the Burd ring, instructions for its installation, etc. The book is bound in a serviceable brown cover 4½ by 8¾ and is priced at 50 cents.

**Belt Tests for Motors** have been inaugurated by the Continental Mfg. Co., Detroit, Mich., to precede the block test under their own power which was formerly the first test. By running the motors in on the belt first injury to bearings, etc., in the subsequent running is eliminated. The new belt test department has been so located in the factory that it comprises a link in an unbroken chain of progression, the motor coming from the final assembling floor at one end and going to the block test department at the other, the motors being moved by an overhead trolley. The belt test lasts 4 hours.

**Road Preservation and Dust Prevention** are the topics treated by Bulletin No. 257 issued by the U. S. Department

One of many demonstrations of the new 5-ton Watson bottom-dumping front-driven motor truck which are being conducted by the Watson Wagon Co., Canastota, N. Y., in various parts of the country. The above-illustrated demonstration was made at Unadilla, N. Y., where the Schunnemunk Construction Co. is doing a large job of resurfacing. The Schunnemunk company was one of the first purchasers of the new vehicles. The top picture shows the truck receiving its load direct from the bottom-dumping car—from bottom-dump to bottom-dump—and the lower views show the truck spreading the crushed stone along the highway, as viewed from two angles. The regularity with which the load may be spread is a feature of the Watson product.

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New quarters of the Society of Automobile Engineers, at 29 west Thirty-ninth street, New York City, just 2 blocks from the office of THE COMMERCIAL VEHICLE at 239 west Thirty-ninth street. The former location of the S. A. E. was in the U. S. Rubber building at Columbus Circle, but the new one, besides being more central, is in the Engineering Societies Building, a magnificent structure devoted exclusively to offices and meeting halls for engineering societies. Besides the S. A. E., the Electric Vehicle Assn., the American Society of Mechanical Engineers, the National Electric Light Asso., and many others share the same roof

The upper left view shows the business office, the upper right, the members' room, the lower left the council room and the lower right the conference room and secretary's office. The partition to be seen to the left of the members 'room and to the right of the council room is removable, opening the two together for committee of section meetings when a gathering not large enough for a hall, but too large for one of the rooms gets together. Only about half of the council room is shown. It is used for the editorial work incident to the publication of the society's bulletin and other matter

of Agriculture, Washington, D. C. This bulletin is the report of progress made in various experiments in different parts of the country. Local coralline rock was used in connection with a bituminous binder at Lemon City and West Palm Beach, Fla. Bituminous surface treatment was used on test roads at Chevy Chase, Md., and on the Rockville Pike. Bituminous macadam was used at Jamaica, L. I. Other reports cover recent inspections on work previously carried at Ridgewood, N. J., Boise, Idaho, Ames, Ia., Knoxville, Tenn., Youngstown, O., Newton, Mass., Garden City, Dodge City, Buckles and Ford, Kan., and Bowling Green, Ky.

**Lower Prices Abroad Than at Home Are Justified,** according to John Hays Hammond, who recently addressed the Cleveland Advertising Club, Cleveland, O., on the subject of "The Factors in the Development of Our Foreign Trade." He based this opinion on the fact that exporters are dealing with surplus products. The sales of American-made goods abroad prevents local factories from closing down and retards the development of industry abroad which would enable foreigners to compete in our home markets. In his talk Mr. Hammond also touched upon the effect of the war upon our trade and the necessity for greater steamship facilities, a better foreign banking system, and a larger amount of support from the United States government.

**Mammoth Generators at the Ford Plant in Detroit** are said to be of sufficient size to furnish home illumination for a city of 108,000 inhabitants. Six direct-current generators are now being installed and will develop 45,000 horsepower, to be distributed to shop machines by means of numerous overhead motors. It is estimated that each of the new generators will produce enough current, when running at normal speed, to light more than 90,000 40-watt tungsten lamps of the kind commonly used in home lighting. Allowing an average of twenty-five such lamps to a house, the current generated by the six units will be sufficient to furnish current for a city of 108,000 people. The new generators are of such huge size that they had to be shipped in parts from the plant of the Crocker-Wheeler Co., Ampere, N. J., because it would have been impossible to get them through many of the railroad tunnels and under many of the bridges. The total weight of each generator, including the shaft, is figured at 135 tons.

**Atlas Foundry Co.,** Detroit, manufacturer of castings for motor vehicle parts, will soon begin the erection of a large factory on Artillery avenue, to be 88 by 270 feet. The new building will be of steel frame construction and will cost approximately $25,000. The foundry will be equipped with a traveling crane of 5 tons capacity and with other modern improvements.

## Commercial Motor Vehicle Agencies Recently Established Throughout the Country

| | | | | | |
|---|---|---|---|---|---|
| St. Paul, Minn. | Denby | Arend Bros. | Cincinnati, O. | Vim | Bessemer Motor Sales Co. |
| Saginaw, Mich. | G. M. C. | M T Z Auto Co. | Evansville, Ind. | Vim | A. W. Rowles |
| Ottawa, Ont. | Kelly | McDonald Bros. | Harrisburg, Pa. | Vim | Hentz-Landis Auto Co. |
| Stamford, Conn. | Koehler | N. J. Wadham | Lancaster, Pa. | Vim | S. A. Barley |
| Birmingham, Ala. | Republic | Crute-Crawford Mfg. Co. | Louisville, Ky. | Vim | J. M. Audient & Sons |
| Spokane, Wash. | Studebaker | A. H. Brown | New Bedford, Mass. | Vim | Auto Selling & Supply Co. |
| Albany, N. Y. | Vim | Black & White | Utica, N. Y. | Vim | Beatty Motor Sales Co. |
| Bangor, Me. | Vim | Bangor Motor Co. | Youngstown, O. | Vim | W. H. Benson Co. |

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"The Truck of a Thousand Uses"

# We Help Our Distributors To Sell Trucks

This company is doing *more than ever* to help Garford distributors.

We have just completed compilation of the most complete and definite truck sales data ever gathered. It points out unmistakably the remarkable efficiency of Garford trucks as compared with all other makes.

This invaluable material is placed directly at the disposal of Garford salesmen. It helps them sell trucks.

Eight motor truck experts have been added to our competent corps of factory representatives. These men are now in the field, co-operating with Garford distributors in every possible way.

We are doing *more than ever* to build up and guarantee an *extensive domestic sale* of Garford trucks.

Twelve big distributors have joined the Garford forces in the last two weeks. We are closing with others daily.

Do not overlook the *biggest dealer opportunity in motor truck history.*

Now is the time to look into our unusually attractive dealers' agreement.

Write us today!

*Please address Dept. 103*

**The Garford Motor Truck Co., Lima, Ohio**



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Where Strength and Dependability are required to withstand the abnormal strains imposed on the power unit and other parts of commercial vehicles

**Wyman & Gordon Drop Forgings**

are needed.

We analyze and test every piece of steel we use and we guarantee our product through and through.

**The WYMAN and GORDON CO.**

WORCESTER • CLEVELAND • DETROIT

**Our 6 yd. Low side Semi-Dump Body with Automatic Tail Gate and Distributing Device. Hand or Power Hoist.**

**2 to 6 Yards** **S M 1**

**R D 1**

**Our full lift elevating Rear Delivery which we have been building for the past 30 years with additional improvements, getting out new ideas and patents on same. Latest rear delivery nose with patent side delivery attachment as well as rear.**

**Capacity 2 to 10 Tons. Hand or Power Hoist.**

**Manufactured by**

**The Thos. Wright Co., Inc.**

**Jersey City** **New Jersey**

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Swedish Steel
Double Row Ball Bearing

**SKF**

S.K.F. Ball Bearing Co.
50 Church St. New York



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The river channel, over 60 feet deep, runs close to the shore. The entire property can be purchased for less than $100,000. Labor plentiful and cheap. Here is an unusual opportunity for the manufacturer who needs water-front.

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TROY Trailer in use in Grand Rapids, Mich., by The Bissell Carpet Sweeper Co.


A TROY Trailer under the right conditions will at least double the earning power of your Truck. If the conditions aren't right, we will frankly tell you.

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Troy Trailers

America's Leading Truck Builders who have tested truck wheels are using

WEST'S CAST-STEEL WHEELS

We have sold 8,000 of them and every one has given absolute satisfaction.

Stronger and lighter than wooden wheels designed for the same service.

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805-815 East 70th Street
Cleveland, Ohio

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FEDDERS RADIATORS

# Quality

Many of the foremost manufacturers of pleasure cars and trucks are shrewd enough to discriminate between qualities and attributes.

*Quality is Perceived*
*Attributes are Ascribed*

Quality is that which makes or helps to make a thing what it is.

Fedders quality is what makes or helps to make Fedders Radiators the most efficient—it is a fact—something that is perceived; not merely an attribute we have ascribed to them.

Fedders Quality is worthy of your consideration—adoption.

**Fedders Manufacturing Co.**
Incorporated
BUFFALO NEW YORK

# Annular Ball Bearings Reground

ONE FIRM ONE SERVICE

ONE GUARANTEE

BACK OF
EVERY BEARING REGROUND

BY

**Ahlberg Bearing Company**
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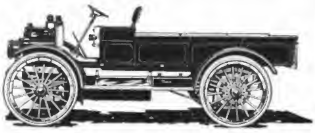

# The Reason Why He Bought An International Motor Truck

"A neighbor of mine, a paper hanger and painter, bought an International motor truck four years ago. We thought he made an error of judgment in buying any truck, but day after day he went out with it in the morning and came back at night.

"Then the time came when we had to buy more delivery equipment. It dawned on me that I had never known my neighbor to miss a day, and when I remembered that he had been carrying men and material in it for over four years, it took me just about a minute to decide to buy an International motor truck rather than more horses and wagons. That is the reason I bought my truck, and I'm glad I did, for I'm saving money and getting just the same rain-or-shine service out of it that my neighbor got."

If you are trying to decide which truck to buy, look up some of the records for steady work made by the International motor truck. They will help you to decide right. There are three up-to-date models—"M" for 1,000-lb., "E" for 1,500-lb., and "P" for 2,000-lb. loads. One of them is just the truck for your work. A post card brings full information.

**International Harvester Company of America**
(INCORPORATED)
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USE THE
# PIERCE
## Speed Controller

as standard equipment, thus ensuring your customers a truck speed regulation that is beneficial in saving of motor, tires and fuel.

PIERCE-equipped trucks climb a 50% stair without difficulty, a fact utterly impossible with any other speed controlling device.

A few motor manufacturers who use PIERCE Controllers as standard equipment and in large quantities.

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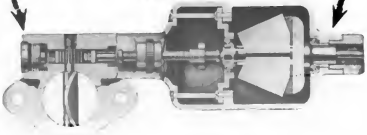
Wisconsin Motor Mfg. Company
Waukesha Motor Company
The Buda Company
Hasard Motor Mfg. Company
Herschell-Spillman Company

**Pierce Speed Controller Company**
Anderson, Indiana





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**Standard** CHAIN AND CHAINLESS **TRUCKS**

**Dealers Receive Real Cooperation**

STANDARD Trucks have been sold in almost every large city of the U. S. A. with practically no advertising, which demonstrates that the remarkable mechanical perfection of STANDARD Trucks have won and held the confidence of the buying public. It will pay "live dealers" to investigate our very liberal agency proposition. Send for Booklet B-26 describing all capacities.

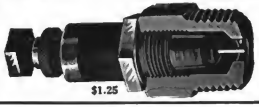
**Standard Motor Truck Co., Detroit, Mich.**

## COMET AND SOOTLESS SPARK PLUGS

ARE THE BEST

BECAUSE—1. They are the strongest made; 2. They are absolutely indestructible; 3. One Comet or Sootless will outlast four of any cheap porcelain or mica washer plug made; 4. They are absolutely compression-tight. *Safe, Sure and Reliable. For sale by all dealers.*

Manufactured by **OAKES & DOW CO., 15 Chardon St., BOSTON, MASS.**



$1.25

## BOSCH

Dependable ignition can only be obtained from a permanent source of electricity that is, a Magneto, a Bosch Magneto only.

Be Satisfied—Specify Bosch

**Bosch Magneto Co.**
203 W. 46th St., New York

## U. S. MOTOR TRUCKS

—have won the confidence of their owners throughout the world by 5 years of matchless performance, service and durability.

RELIABLE DEALERS WANTED

The Agency Is a Valuable Asset

Capacity
2 Ton
2½ Ton
3 Ton
1 Ton

If you are considering taking on an agency, or should be dissatisfied with present arrangements, WRITE US. Our proposition is a money-maker. Address Contract Dept. D.

**THE UNITED STATES MOTOR TRUCK CO., Cincinnati, Ohio**

## FRAMES

THE PARISH & BINGHAM CO
CLEVELAND OHIO

Our entire engineering force is at your disposal.

## MODERN 1915

## GET IN LINE

With your co-operation, we are able to supply you with just the truck that will give the most satisfactory and profitable results in your business—Chain or Worm drive models.

**Model "H" 1½ Ton Chain Drive. Model "L" 1 Ton Worm Drive**
**Model "M" 1½ Ton Worm Drive. Model "P" 2 Ton Chain Drive**

**The Bowling Green Motor Truck Co., Bowling Green, Ohio**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# Baker Electric Trucks

IN the ownership and operation of an electric truck, the recollection of quality remains long after the price is forgotten. It is so much less expensive to *invest* a little more money once for all in a Baker Electric than to *spend it* annually in higher cost of running just an ordinary truck.

*"Electric Trucks Last Ten Years"*

THE BAKER, R. & L. COMPANY

Makers of Baker Coupes, Broughams and Roadsters

CLEVELAND, OHIO

*Branches or Dealers in Principal Cities*
*Live Dealers Wanted in Open Territory*

# The Highest Efficiency

is attained in this worm-drive truck by powerful construction according to a correct four-wheel-drive principle which distributes and equalizes the driving stresses.

**MORTON TRUCKS, 1½ to 6 Tons Capacity**

in both regular type and four-wheel-drive are built to take hard usage and show permanent economy.

This serviceability is due to the thorough design of the vehicle as a whole and the use of the better standard parts. Study the specifications!

Write us for open territory and get into this four-wheel-drive business.

**Morton Truck & Tractor Co.**

HARRISBURG, PA.

# SAFETY

—devices protect chauffeurs who operate machines equipped with COTTA Transmissions.

Special COTTA equipment provides a locking device, which positively prevents engagement of two speeds at the same time.

Regardless of speed of car or rotation of gears, speed changes are made easily and instantly with the COTTA Transmission.

Have your next car COTTA safe-guarded.

**Cotta Transmission Company**

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# —Sheldon Springs—

**Designing a truck presents no nicer problem than that of providing it with springs.**

**No concern in the world is as well prepared to solve this problem—none with the amount of experience—none with the varied experience—none with the facilities and equipment, either human or mechanical, that the Sheldon Axle and Spring Co. offers.**

**Collectively—these facts are the reason why the service Sheldon Springs will give is a known quantity and a guaranteed quantity.**

**SHELDON AXLE AND SPRING COMPANY**

**Wilkes-Barre, Pa.**

Makers of Springs and Axles for Heavy Duty Service for more than 50 years.

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**A TYPICAL MACK PERFORMANCE**

Waite's Motor Van & Storage Company of New York recently sent one of its 2-ton Worm Drive Macks to New Haven under a heavy load. The driver had to shift gears only once —and he made the round trip (156 miles) on 18 gallons of gasoline and ¾ of a gallon of oil.

**What *Macks* have done for others, they can do for you.**

***Capacities 1 to 7½ tons—5 to 15 ton Tractor Trailers.***

Write—'phone—or call and see us.

INTERNATIONAL MOTOR COMPANY

64th St. and West End Ave.
NEW YORK

## Easy to Read

Figures do not revolve—always right side up. Grease- and dirt-proof—glass window keeps clean on the inside.

# TRANSIMETER

(Hub Odometer)

is also guaranteed indestructible. The heavy cast housing and wide air space protect the mechanism from damage by collision.

*Highest award at Panama-Pacific International Exposition*

Send for booklet

AMERICAN TAXIMETER CO.
*Mfgrs. of Jones and Popp Taximeters*
131 West 39th Street New York

## Performance—Not Price

THE maker who equips his truck with the Buda Motor does not select his motor on price alone. He is jealous of his reputation and his product; he believes that his customers' satisfaction is part of the bargain when they hand him their checks. So, regardless of price, he makes comparisons and careful tests and finishes by selecting the Buda Motor, built by a great organization which *for 35 years* has backed every last screw and bolt of its product with its name and all its vast resources. Every Buda Motor is not only guaranteed—it is *much more than guaranteed* by the fact that a part of its duty is to live up to the name it bears.

"If the MOTOR is not right, the car is wrong."

THE BUDA COMPANY

Factory, Harvey, Ill. (Chicago Suburb)
Address FACTORY REPRESENTATIVES:
BRANDENBURG & CO., 1112 S. Michigan Avenue, Chicago
37th & Broadway, New York, N. Y. 1311 Dime Bank Bldg., Detroit



# Russel

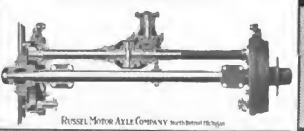
## Internal Gear Drive Axles

## Proof of Serviceability

Every one of the Internal Gear Rear Drive Axles which we have sold has been and is now giving satisfactory uniform service under trucks.

The most exacting experience with trucks using the RUSSEL Internal Gear Axle has proven beyond question the correctness of this principle and of RUSSEL design, and has demonstrated the dependableness of RUSSEL reputation for high quality of workmanship and materials.

RUSSEL MOTOR AXLE COMPANY
NORTH DETROIT, MICHIGAN







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## The Wood Hydraulic Hoist

SOLVES THE DUMPING PROBLEM FOR MOTOR DUMP TRUCKS

"Made in Detroit Only" by the

**WOOD HYDRAULIC HOIST & BODY CO., Detroit, Mich.**

Successors to WOOD HYDRAULIC HOIST CO., St. Paul, Minn.

Brown-Lipe transmissions and differentials represent the maximum from a standpoint of efficiency and durability.

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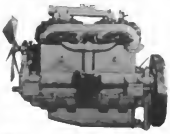

## Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor **specialists.** The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

**BEAVER MFG. COMPANY**

**Milwaukee** **Wisconsin**



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# Truck Tires Free

**Unless the Goodyear S-V Outwears Any Other**

We now extend this Guarantee to October 1st. Many truck owners were not in shape to accept it during April, May and June. And we want every user to have this chance to prove the S-V best.

**Equip opposite wheels—at the same time—one with a Goodyear S-V, one with any other standard Truck Tire of like rated size, bought in the open market. If the Goodyear S-V fails to cost less per mile than the other, we will return you its full purchase price, making the S-V free.**

Get this guarantee in writing when the tires go on. Equip all the wheels you wish. Compare the Goodyear S-V with every seeming rival in this convincing way. Then you will end all your costly experimenting. Then you will know the truth.

We guarantee the Goodyear S-V against any tire that's built.

We dare do this because we have already made 5,000 tests and comparisons. Barring accidents, the Goodyear S-V will surely win against any rival Truck Tire. There are reasons for it. One is more available tread rubber. Another is no creeping, no bulging or breaking, no possible separation. The tread, the backing and the rim are one. Our local branch will tell you where to get the S-V tires under this signed warrant.

GOODYEAR AKRON, OHIO
S-V Truck Tires

**The Goodyear Tire & Rubber Co., Desk 86 Akron, Ohio**
Makers of Goodyear Portified Automobile Tires
We make Demountable, Block, Cushion, Pneumatic and Other Types of Truck Tires

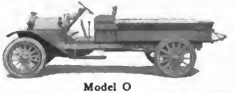


# Will Carry a Message to Garcia

Sanford trucks are those substantial and efficient trucks representative of quality and character.

They are built by men who know how, under the Sanford policy of character and quality in their product.

If you want to carry a message to Garcia in your delivery department, a Sanford truck will do it.



Model O

Model O
¾ Ton
$1350
Express

$1290
Chassis

Model M
4000 lbs.
$2000
Express

$1910
Chassis

Model M

Dealers are at liberty to send for Sales Plan and inquire for open territory.

**Sanford Motor Truck Company**
Syracuse, N. Y.

One of six Jeffery Quads in the service of the United States Army Signal Corps. This is the most powerful portable wireless station in the world. The Jeffery Quad drives, brakes and steers on all four wheels.

The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin



CONTINENTAL MOTORS · Powerful as the Nation · AMERICA'S STANDARD

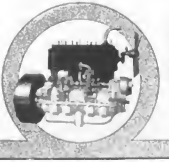
# Continental Motors

**Commercial Four-Cylinder Models**

| | | | |
|---|---|---|---|
| Model U | 2¼ x 4 | Model C | 4½ x 5¼ |
| Model N | 3½ x 5 | Model E | 4½ x 5½ |
| Model N | 3¾ x 5 | Model T | 5 x 5¾ |
| Model C | 3¾ x 5¼ | Model T | 5¼ x 5¾ |

Continental Motor Manufacturing Co.
DETROIT, MICHIGAN

Largest Exclusive Motor Builders in the World



Factory Representative K. F. Peterson, 127 So. Michigan Ave. Chicago

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CONSTANT·DEPENDABLE·SERVICE
PITTSBURGH MODEL ENGINE COMPANY
MODEL MOTORS
PITTSBURGH PA.

**Ross Steering and Differential Gears**

**Will Help Sell Your Trucks**

They are
**STANDARD**
on good motor truck construction

**Investigate**

our new complete line of fore and aft steering gears.

Enormous bearing surfaces
Perfect lubrication
Best material throughout
Finest workmanship

Built in the largest and newest steering gear factory in the United States.

*Write for catalog*

**ROSS GEAR & TOOL COMPANY**
790 Heath Street Lafayette, Ind.

BUILT IN AMERICA

*From European Design—With Careful British Shop Practice*

**Burford Trucks**

One- and one-half ton. Internal gear final drive.

**The H. G. Burford Co.**
FREMONT :: :: :: OHIO

COVERT COVERT COVERT
TRANSMISSIONS

**Of the Highest Quality**

Covert Transmissions are the result of many years' successful transmission building—today they are recognized as the best—not only in point of service and durability but also in regard to quietness and all around efficiency.

Made in various models for different sizes and types of cars—Covert Transmissions will free you from transmission troubles. Let us show you how they fit your construction.

**Covert Motor Vehicle Co.**
SALES OFFICE Detroit, Mich. FACTORY Lockport, N. Y.



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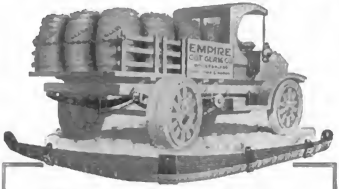



## Trust Fragile Freight to
# DETROIT SPRINGS

THEIR resiliency and flexibility lessen danger of damage. The secret of their smoothness lies in the lubricating cups, near the end of each leaf. These cups are filled with a long-lived lubricant that spreads between the leaves, insuring velvety action and silence. Detroit Springs are

**Guaranteed for Two Years**

against "settling," cracking or breaking—twice the guarantee given on ordinary springs. Learn more about Detroit Springs by reading the book "From the Ore to the Motor Car." Write for it.

**DETROIT STEEL PRODUCTS COMPANY**
2260 East Grand Boulevard :: Detroit, Michigan

## When a Man Buys a Truck

the first thing he wants to know is what kind of a motor it's got. He wants to be sure first of all of the power plant. He wants a motor with a record behind it, a motor that other truck owners have tested out for him, that they have found stands up to the grind of hard, gruelling work day in and day out, year in and year out.

*Wisconsin*
CONSULTANT
**Motors**

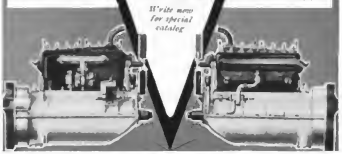
have won their high standing because of the service they have given. They are durable, economical, dependable.

Type T-U
4 in. bore,
6 in. stroke
Intake View

Wisconsin Motor Mfg. Co.
Station A, Dept. 379
Milwaukee, Wisconsin

*Write now for special catalog*

Type U-U
4¼ in. bore,
6 in. stroke
Exhaust View



## The United Line

DEALERS—
Work With
"United"

| | |
|---|---|
| 2 ton Worm Drive Truck | $2250 |
| 3½ ton Worm Drive Truck | 2900 |
| 5 ton Worm Drive Truck | 3400 |

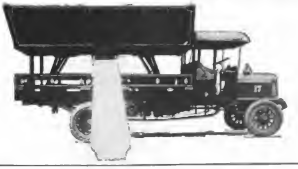
Nothing Experimental—
Nothing Obsolete

Continental Motor
Ellemann Magneto
Stromberg Carburetor
Wage Radiator

Brown Line Transmission
Spicer Drive Shaft
**United Factors**
Structural Steel Frame
Yale Jacked Speed Governor

Perfection Springs
Timken Axles
Timken Bearings
Gemmer Steering Gear

**UNITED MOTOR TRUCK CO.** Grand Rapids Michigan



**Elevates 6 Tons by Hand in 4 Minutes**

The six-ton Commer car shown here is equipped with New Ideal Body and Elevating Device. Load can be elevated by hand in four minutes. Body is divided into three compartments of two tons each. A good example of New Ideal Body efficiency.

We manufacture bodies to your specifications. Two to ten tons. Hand or power hoist. Side or rear delivery. Photos and particulars on request.

**New Ideal Wagon Works**
1845-47 Park Avenue, near 126th Street, New York

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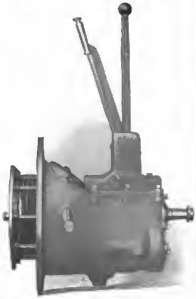
# FULLER
## Unit
## TRANSMISSIONS

Model
"T U"
¾-1 Ton

Model
"T U 2"
1½-2 Ton



*Particulars sent on request*

**FULLER & SONS MFG. CO.**
**Kalamazoo, Mich.**

CHASE

MOTOR TRUCKS

1500 POUNDS $1500 — 4000 POUNDS $2200 — 7000 POUNDS $3300

WORM DRIVE — WATER COOLED MOTOR
EXTRA HEAVY FRAME — UNIT TRANSMISSION

CHASE MOTOR TRUCK CO.
HAVERSTRAW, NEW YORK

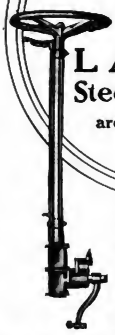
"CHASE YOUR DELIVERY"

# Eliminate Doubt
## make assurance doubly sure

There is a real reason why

**LAVINE**
**Steering Gears**

are recognized as America's standard



More than any other part of the truck equipment, the steering gear needs to be reliable. Neglect in this respect may very easily lead to serious trouble. LAVINE Gears will set your mind at rest.

**The answer lies in the fact itself**

Four sizes—½-ton to 5 tons. Send for blue prints.

**LAVINE GEAR COMPANY**
**Station A** **RACINE, WIS.**

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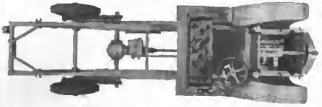
# SOUTH BEND



## Double Duty Trucks

—once put in service—always remain in service.

Whatever your business may be there is a SOUTH BEND DOUBLE DUTY TRUCK that will give you the utmost efficiency and satisfaction.

***Wisconsin motors, Warner transmission, Sheldon axles, Ross steering gear, Bosch ignition. Either chain or worm drive.***

SOUTH BEND DOUBLE DUTY FIRE APPARATUS in all cases more than performs its duty.

Attractive Dealer Proposition. Write us at once.

**South Bend Motor Car Works**
**SOUTH BEND, IND.**

# Watch Your Brakes

When a truck won't run, you lose time. When it won't stop, you are apt to lose the truck. Which is more important?

Keep the truck running by all means—that's what it's for. But don't forget the brake linings.

A lot of brake linings are not reliable. When the outside coating wears off they become worthless—friction-shy.

**Thermoid**
**HYDRAULIC COMPRESSED**
**Brake Lining-100%**

Brake lining, to be 100 per cent, must be brake lining all through. Not merely on the outside. It must be trustworthy to the last.

Thermoid retains its 100% gripping power even until worn *paper-thin*. Hydraulic compression makes it one solid, single substance of uniform density clear through—instead of being loose and stringy (and friction-shy) on the inside, as in ordinary woven brake lining. Guard YOUR truck with Thermoid.

Cannot be burned out nor affected by oil, heat, water gasoline, dirt.

## Thermoid Rubber Company
**TRENTON, N. J.**

**Our Guarantee: Thermoid will make good—or We will.**

# Celfor INTERNAL GEAR DRIVE Axles

**For Motor Trucks—Absolutely Quiet**

If you want a strong efficient unit drive that is specially designed for truck work, from one to three tons capacity, write us for complete information about the

## Celfor
## Internal Gear Drive Rear Axle

It possesses marked constructional advantages which commend it to thoughtful designers, engineers and truck makers. We shall be glad to go into these in detail on request.

**Write today for details, catalog and prices**

**Celfor Tool Company**
**Buchanan Michigan**

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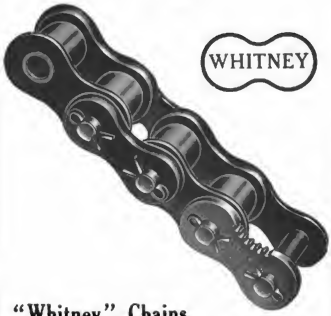



## "Whitney" Chains

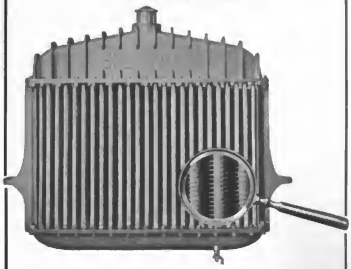
are made by specialists in the foremost organization for chain design and manufacture in America. Our aim is dependability of service under hardest conditions, and our success in this is shown by the standardization of "Whitney" Chains by the leading motor truck makers of the country.

**The Whitney Mfg. Co., Hartford, Conn.**

Chains—Keys—Hand Milling Machines

## RADIATOR INSURANCE

The cooling section of this Rome Helical Tube Truck Radiator is guaranteed for the life of the truck.

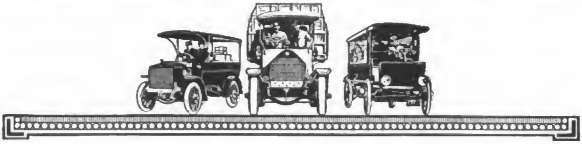


Highest in Quality and Efficiency Highest in Price

*Write us for details*

**ROME-TURNEY RADIATOR COMPANY**

ROME, NEW YORK



# Don't Be An Esau!

Don't Sell Your Birthright for a Mess of Pottage. The Domestic Business in Motor Trucks Belongs of Right to the Most Progressive, Most Responsible and Most Active of Manufacturers in the United States.

The War Orders Have Been a Grand Good Thing for the American Commercial Vehicle Industry—But Don't Chase the Export Bubble at the Expense of the Home Business. No One Knows What Will Follow the War.

The United States Market Will Steadily Improve No Matter What Happens.
Read What One Conservative Producer of Trucks Made in U. S. A. Has to Say About It:

"Our business for the last 6 months has shown an increase of over 45 per cent over the same period last year. None of this business is made up of war orders; it is all strictly domestic business and the striking feature of it is that more than 50 per cent of the orders received have been repeat orders from satisfied users. (Name on request)

The COMMERCIAL VEHICLE

READ BY BUSINESS MEN

Detroit: 95 Fort St., West

239 West Thirty-ninth Street
New York City

Chicago: 910 S. Michigan Ave.

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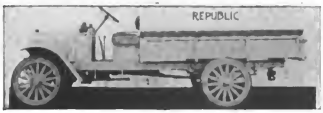
# EISEMANN

OF THE 93 manufacturers who use Eisemann magnetos in this country, 69 are truck makers.

If you are not one of the 69 Eisemann users you are not getting the greatest possible ignition efficiency.

**The Eisemann Magneto Co.**
Sales and General Offices
**32-33rd Street, Brooklyn, N.Y.**

New York, 245 West 55th Street
Indianapolis, Ind., 415-417 North Capitol Ave.
Detroit, Mich., 802 Woodward Ave.




¾-Ton Model

# Republic Motor Trucks

***The Fastest Selling Line of Motor Trucks in America***

¾ Ton with Express Body, Internal Gear Drive ..... $ 995.00
1½-2 Ton Chassis, Internal Gear Drive ..... 1575.00
1 Ton Chassis, Chain Drive..... 1350.00
1½ Ton Chassis, Chain Drive..... 1475.00

## The Vitals of the Republic

1 and 1½-TON MODELS (CHAIN DRIVE)

Continental Motor
Timken Axles
Bosch Magneto
Stromberg Carburetor
Russel Full Floating Jack Shaft
Covert Transmission
Standard Cone Clutch
Firestone Tires

***No Better Units Built***

We ask the opportunity to prove our statements. Wire or write for catalog and complete information.

**Republic Motor Truck Co., Alma, Mich.**

# FAFNIR

SEND FOR CATALOG
FAFNIR BEARING COMPANY
NEW BRITAIN, CONN.

# Safety—Security—Ease

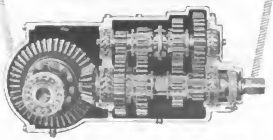
—in shifting gears on your car, result in greater satisfaction, saving, and longer gear life.

## Cotta "Short Series" Transmission

—insures the easy and safe shifting of gears at all times, under all conditions.

Require Cotta "Short Series" Transmission on your next truck for safety, durability and economy.

**COTTA GEAR CO.**
720-730 Sixth Street, Rockford, Ill.



UNSURPASSED FOR STRENGTH

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# STRENGTH! QUALITY! SERVICE!

# MOTOR TRUCK SPRINGS CORRECTLY HEAT TREATED

**THE CLEVELAND-CANTON SPRING COMPANY**
**CANTON, OHIO**

# DOES THIS INTEREST YOU?

Suppose you could get a hauling job at 66 2-3 cents per ton, over a haul of reasonable length, on the best types of streets in your city. Would that interest you? Well, in your city, there is a lot of this sort of freight to be hauled. It is self-loading and unloading. It is a live load, and it is a clean load. It is a load that you can carry both directions. You are paid in advance for hauling it. There are no seasons in this kind of business, for the load must be carried every working day in the year, and on Sundays and holidays it is greater than on week-days.

You have probably guessed by this time the kind of load we mean: **passengers**. The average passenger weighs 150 pounds—thirteen and one-third passengers to the ton, at 5 cents apiece, total, 66 2-3 cents per ton.

The illustration shows two jitney buses in use in Baltimore, Md., hauling this highly-paid class of freight. They are mounted on 1-ton Bessemer chassis, with an economical type of all-weather bus body. Write us, and we will tell you why O. L. Wright bought Bessemers, and how much it will cost you to buy some like them.

They are made in all styles and capacities, of course—to fit your particular local requirements. Is there any other class of trucking that will pay as high rates as this, open to you?

**BESSEMER MOTOR TRUCK COMPANY ∴ Grove City, Pa.**




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# A TRUCK THAT PULLS THE LOAD

The above illustration shows a Duplex Four-Wheel Drive Two-Ton Truck performing an almost unbelievable feat. A flock of sheep which, together with the trailers, weighed over twenty tons, was hauled a distance of six miles over poor country roads. Due to the extremely rugged construction of the truck and its all-four-wheel traction, the run was accomplished without difficulty.

The Duplex is the peer of any truck built for strength and general efficiency. Made in two-ton and three-ton capacity. Fully covered by patents.

***We have an attractive dealers proposition. Get in touch with us immediately.***

**THE DUPLEX-POWER CAR COMPANY**

***Manufacturers of*** — **Four Wheel Drive Trucks**

**CHARLOTTE, MICH.**

# GOODRICH
## WIRELESS TRUCK TIRES

**Cudahy Packing Co., Kansas City,**

is *very well satisfied* with Goodrich Wireless Truck Tires. The illustration shows one of their trucks—a 5-ton Pierce-Arrow.

Goodrich Wireless are replacing other makes of truck tires at the rate of over 1,500 per month!

Don't experiment! Time has proved Goodrich to be best. What others *might* do isn't as certain as what Goodrich *will* do.

**The B. F. Goodrich Company**

**World's Largest Rubber Factory, AKRON, OHIO**

**Service Stations and Branches in All Principal Cities**

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# A Truck That Stays Out of Repair Shops

## The Krebs

The KREBS Automatically Governed Truck at all times is a source of satisfaction to its owner because of the wonderful record it establishes for efficiency, low maintenance cost and operation simplicity.

Equipped with a Continental Motor, silent worm drive, full floating rear axle, center control, left hand drive and automatic governor, the KREBS Truck is one that prospective buyers cannot afford to overlook.

We make ¾, 1, 2 and 3-ton trucks and quote the lowest figures on special bodies.

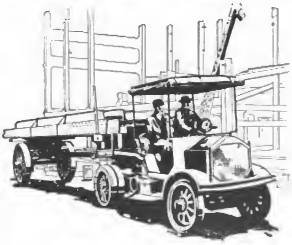
*Write for our dealer proposition and be one of the easy money makers.*

**Krebs Commercial Car Co., Clyde, Ohio**

# SAVE MONEY

## By Hauling Your Loads With a KNOX Tractor

The Power Ahead—
The Load Behind



THE Knox TRACTOR

The Knox Tractor can be the motive power for three trailers, one loading, one unloading and one moving.

The Knox does not carry and push its load like a truck—it hauls it behind. With a double set of springs, no matter what the load, the tractor mechanism does not have to support an additional pound. Flexible springs for the tractor, stiff springs for the trailer.

Any kind of a load in any kind of a wagon.

*Write for our folder, "Heavy Hauling at Light Expense"*

**KNOX MOTORS ASSOCIATES, Springfield, Mass.**

New York 1872 Broadway | Boston 825 Tremont Bldg. | Chicago 1621 Michigan Ave. | Philadelphia 604 Abbott Bldg. | Kansas City 1725 McGee Street

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THE WAY TO
ECONOMY
IS THROUGH
Mc GRAW
TRUCK TIRES

**Guaranteed for 8000 Miles**

Contain 10% to 20% more rubber than others of same rated size.

The toughest and easiest-riding of all solid rubber tires.

Applied and removed by the ordinary tire press—***and no more expensive than ordinary truck tires.***

Write for our money-saving proposition.

**The McGraw Tire & Rubber Co.**

**Factories and General Offices, East Palestine, Ohio**

*Branches and Agencies in the Principal Cities*

*Hundreds of Applying Stations Conveniently Located*



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# SIGNAL

## Worm-Drive Trucks

## For the Manufacturer

There is a type and capacity Signal truck for practically every haulage requirement.

Signal trucks are simple in design and construction and in operation. Silent in use, efficient, and made for long and constant service.

Best of all, Signal Trucks cost less to operate than you are aware and if interested let us refer you to SIGNAL OWNERS in your line of business—they know.

| | | |
|---|---|---|
| 1 | Ton Chassis—Worm Drive | $1500 |
| 1½ | Ton Chassis—Worm Drive | $1700 |
| 2 | Ton Chassis—Worm Drive | $2000 |
| 3½ | Ton Chassis—Worm Drive | $3000 |

**SIGNAL MOTOR TRUCK COMPANY**
**Detroit, Michigan, U. S. A.**

**Two-ton SIGNAL**
**Used by one of the large can manufacturers**

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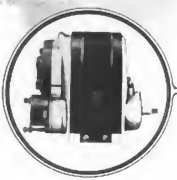
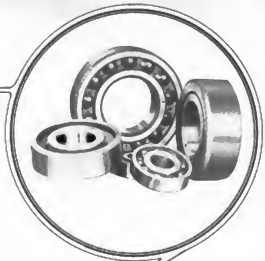
# NEW DEPARTURE BALL BEARINGS

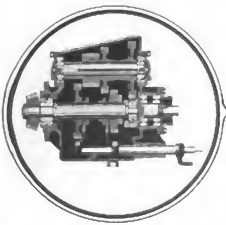
## American Made for American Trade

**are Manufactured in Types, Sizes, Capacities and Quantities suited to every purpose**

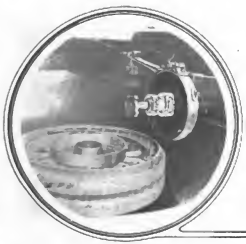


High Speeds
Light Loads





Medium Speeds
Medium Loads



Slow Speeds
Heavy Loads

**The pictures tell . . . the story . . .**

**A large percentage of American made Motor Car Models for 1916 will contain New Departures because of their complete adaptability . . by reason of their inherent goodness . . and because they are absolutely**

***Guaranteed***

**Our expert knowledge of Ball Bearing installation is free to every manufacturer of Motor Cars . . . Promptly upon request.**

**The New Departure Manufacturing Company**

**Distributors in Trade Centers Throughout the United States**

**BRISTOL, CONN., U. S. A.**
**Western Branch: 1016-17 Ford Bldg., Detroit, Mich.**

**Sole British Agents Brown Bros., Ltd. London & Manchester**

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B. A. Gramm's consistent development in the Motor Truck field during the past 14 years gives you in this line of chassis, from 1 ton to 6 tons, the greatest ever produced. The only trucks in the world with fool-proof clutch and transmission. The wonderful increase in our production has come direct from repeat orders.

Your customers want the best at the lowest price. We have the greatest truck selling proposition on earth.

***Write Quick—This Chance for 30 Days Only***

**The Gramm-Bernstein Co. Lima, O., U.S.A.**

TRADE I MARK

TRADE I MARK

ANNOUNCEMENT

OWING TO THE RAPIDLY INCREASED DEMAND FOR TORBENSEN INTERNAL GEAR AXLES, OUR NEWARK PLANT HAS BECOME INADEQUATE, AND WE HAVE SECURED A FACTORY AT CLEVELAND, OHIO, WITH FIVE TIMES OUR PRESENT CAPACITY WHERE WE SHALL BE LOCATED AFTER JUNE 15TH, 1915.

WE SHALL MANUFACTURE AT CLEVELAND A COMPLETE LINE OF SIZES OF FRONT AND REAR TRUCK AXLES.

THE UNDERSIGNED WILL HAVE THE MAIN OFFICE AT CLEVELAND, WHERE WE SHALL BE PLEASED TO WELCOME OUR CUSTOMERS AND FRIENDS, AND WHERE ALSO WE SHALL BE SO SITUATED THAT WE CAN MAKE MORE FREQUENT PERSONAL CALLS UPON THE TRUCK MANUFACTURERS.

OUR ADDRESS WILL BE:

EAST 72ND ST. & L. S. & M. S. R. R.

CLEVELAND, OHIO

TORBENSEN GEAR & AXLE COMPANY

V. V. TORBENSEN, PRESIDENT
J. O. EATON, TREASURER

TRADE I MARK

TRADE I MARK




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# Kelly-Springfield

## TIRES FOR COMMERCIAL VEHICLES

Kelly-Springfield steel-base truck tires in Pressed-on and Demountable types represent the highest development in quickly applied, practical, durable and resilient tires for commercial vehicles and are built to deliver record mileage under the severest service conditions.

**Kelly-Springfield Tire Company**

**Akron, Ohio**

BRANCHES IN ALL PRINCIPAL CITIES




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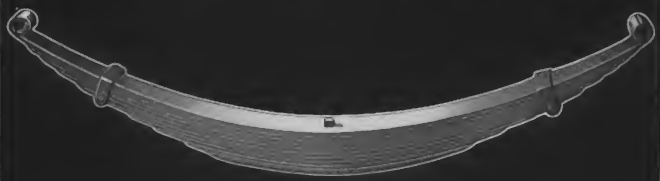
# "The Spring Is the Thing"



## MATHER

Scientifically Heat-Treated

## SPRINGS

designed to insure

## Maximum of Elasticity and Endurance

with

## Minimum of Vibration

Genuine made only by

## The Mather Spring Company

Toledo, Ohio

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# HESS-BRIGHT

THE dominancy of ball bearings in racing cars is a striking tribute to their greater efficiency for power transmission in motor car construction.

¶ To the best of our knowledge and belief not one single racing classic either here or abroad has ever been won on other than a ball bearing equipped car.

¶ Racing drivers and car makers know that the use of other than ball bearings compromises the efficiency of their cars. So for that reason practically all racing cars (which must stand the terrific stress of sustained speed generally in excess of a hundred miles an hour) are ball bearing equipped throughout.

¶ In other words—the greater the demands from a standpoint of speed and endurance, the more certain are ball bearings to be used.

## The Hess-Bright Mfg. Co.

**Philadelphia, Pa.**

*Hess-Bright Ball Bearings Are Patented*




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# WHITE TRUCKS

## *Awarded the* GRAND PRIZE

## BY THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION AT SAN FRANCISCO

### THE ONLY GRAND PRIZE—THE HIGHEST AWARD FOR MOTOR TRUCKS

Was conferred upon White Trucks by the Superior Jury of Award, as officially announced by the Secretary of the Jury under date of August Second.

This is the ONLY GRAND PRIZE received by any motor truck at the Panama-Pacific International Exposition.

This decision of the Superior Jury of Award reflects the opinion of the largest users of motor trucks throughout the world—and is in accordance with the actual service results of motor truck experience. The points of merit upon which the Grand Prize is awarded are identical with those that have determined the selection of White Trucks by America's foremost firms in every line of business.

White supremacy in the motor truck industry is thus recognized by the highest award that can be bestowed by the greatest exposition the world has ever known—just as this supremacy has been recognized by motor truck users for many years.

### REGARDING OTHER CLAIMS

The decision of the Superior Jury is final in the matter of Exposition awards. Hence any announcements of other motor truck manufacturers, claiming to have received the Grand Prize and Highest Award for motor trucks at the Panama-Pacific International Exposition, are automatically denied by this decision of the Superior Jury of Award.

THE WHITE COMPANY
CLEVELAND

*Largest Manufacturers of Commercial Motor Vehicles in America*




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The COMMERCIAL VEHICLE

Published on the First and 15th of Each Month

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at 231-241 West 39th Street, New York

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Advertisements

Changes in copy for advertisements in the next issue to be in the office of publication not later than 10 days before date of publication.

## Christmas Is Coming

—and with it the holiday rush in the delivery departments of department stores all over the country.

## Prepare Now

Managers and delivery superintendents of dry goods stores will have changes to make, and they will have to make them soon.

They will need expert advice. They will want to know what other stores are doing and have done. They will want to know what the motor truck industry has to offer them in the way of efficient equipment.

The COMMERCIAL VEHICLE

is going to meet this demand by publishing in its October 1 issue, a number of straight-to-the-point articles on the subjects which perplex delivery department executives.

Shipping Room
Loading
Routing
Distributing
Holiday Rush
Vehicle
Equipment
} Problems

will be covered in these articles in an authoritative manner; in the light of expert and extensive investigations conducted by our trained staff of observers in dry goods stores all over the country.

These investigations are now in progress, and there is no department store executive that it would not well behoove to give earnest study to these articles.

## Makers and Dealers

will find in these articles the sort of data on department store conditions that they need to make intelligent and accurate analyses of requirements in order to make the RIGHT KIND of sales—the kind that benefit both seller and buyer—the only really profitable kind.

## Know—Don't Guess

These articles will be unique. They will be widely circulated and closely read. They will reach the men who really COUNT.

A big mistake would be made by a maker or dealer having anything really important to announce to these men if he neglected to send in his copy on time. Such opportunities are rare—Christmas comes but once a year.

Regular departments as usual! The October 1 issue will not be a "Special Issue." There will be matter of interest to all—as usual.

The COMMERCIAL VEHICLE
READ BY BUSINESS MEN
239 West Thirty-ninth Street
New York City



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# Autocars Are Extensively Used in the Lumber Business

*C. B. Coles & Sons Co., Camden, N. J., decided on the Autocar to meet the demand "for quick work in hauling to the suburbs, which costs heavily by team on account of the time consumed in making the long trips."*

*Representative lumber and building materials companies in all sections of the country are adopting Autocar Motor Vehicles, not only because of the saving in time, but also because Autocars make long haul business economical and give prompt, regular service at all times.*

*Write for illustrated catalog and list of over 2600 concerns using Autocars in every line of business*

**Chassis Price, $1650**

***THE AUTOCAR COMPANY, ARDMORE, PA.***

***Established 1897*** *MOTOR CAR DELIVERY SPECIALISTS*




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The Commercial Vehicle
Read by Business Men

Vol. XIII September 1, 1915 No. 3

# Motor Artillery Proves Worth

## Delayed by Bad Bridges, Trucks Perform Under U. S. Surveillance

UNCLE SAM is receiving his first lesson in what motor trucks can do for the United States in time of war at the military instruction camp at Plattsburg, N. Y., on the shores of Lake Champlain. Fifteen motor vehicles are in camp being put through their paces as rigidly as if the U. S. A. were engaged in conflict.

Regular officers of the army are watching keenly two new developments in the military power of this country. They are watching the performance of the business man in his work of qualifying for the officership in the volunteer army and they are studying just as closely the performance of the business vehicle in its work of qualifying itself.

The conflict in Europe has brought pre-eminently to the front the necessity for machine guns and motor apparatus, both as separate units and combined as weapons of offense and defense. It is in connection with machine gun service that motor vehicles are required to perform their most arduous tasks of transportation, speed, and reliability.

### Seventy in Motor Troop

A machine gun troop of seventy men equipped with fourteen motor vehicles is at the camp and in addition the signal corps has one other in the form of a field wireless telegraph station equipped to be rapidly assembled and dismounted and which can send messages a distance of 800 miles. The receiving range of the equipment is over 2,500 miles.

The men composing the machine gun troop are lawyers, bankers and business men from New York, Boston, Philadelphia, Pittsburgh and elsewhere. They are graduates from Harvard, Yale, Princeton and other universities. With this troop beside the fourteen cars, there are twenty machine guns and two 1-pounders. Captain Wm. J. Snedberg, Jr., Second Regiment, U. S. Cavalry, the machine gun expert of the U. S. Army, has accompanied this motor gun troop as officer of instruction and has taken command at Plattsburg. What the cars are doing and how they are equipped are under the direction of this officer and Capt. Raynal C. Bolling, general solicitor of the U. S. Steel Corp., who was instrumental in organizing the troop and the necessary funds have been contributed by Judge Gary, chairman of the board of the U. S. Steel Corp.; Geo. W. Perkins, J. P. Morgan, Brown Bros.,

Mack 3½-tonner, followed by field gun unit and 1-ton Mack transport truck, on the march; below, field gun and caisson in position ready for the word to fire. The performance of this heavy vehicle was one of the surprises of the camp

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Garford 1½-ton combination vehicle in action, showing 1-pound rapid-firer in use and crew of six men in their places

Potter, Choate & Prentice, and White, Weld & Co.

In the camp of the machine gun troop are the trucks mentioned in the August 15 issue of THE COMMERCIAL VEHICLE on page 25. They are four Autocars of 2-ton capacity, one Garford 1½-tonner, one Buick 1,500-pounder, one Mack 1-tonner, and one Mack 3½-tonner, and in addition two Cadillacs, a Ford, Simplex, Locomobile and Mitchell on touring chassis. These, with the exception of the Ford and Locomobile, have been supplied by the factories in order to aid in the work of determining the usefulness of the motor vehicle for the strenuous service of machine gun and all around work under conditions similar to those of warfare.

**Most Cars Armed**

On each of the cars of large enough capacity there is mounted a machine gun. Each of these cars has its crew which can quickly man it and travel over the road for scouting purposes, transport work, or whatever comes within the range of possibilities of the body with which the car is equipped. The lessons to be learned on the other side are being slowly grasped and the bodies with which the chassis are equipped are copies in nearly every case of those which are used to such good effect on the fields of France.

On the Garford 1½-ton chassis, for example, there is mounted an all-around utility body which can be either an ambulance or a transport and machine gun truck. When used as an ambulance the machine gun, of course, is removed to bring the truck under the protection of the Red Cross. At that time the car can go right to the front and pick up wounded men as far as battle conditions will permit. It has a capacity of six stretchers, which can be carried on racks supported within the body on uprights, as will be noted in the illustration. The body, however, is more of a transport and machine gun outfit than an ambulance.

With the machine gun mounted on the rear platform, and with the side seats for the crew, a speed of 35 miles per hour can be secured. If desired, the seats can be removed and the men crowded together to the utmost capacity of the vehicle. When not near the firing line the machine gun is removed and placed in a bag which is carried in a space provided for it beneath the side seat. The stretchers fold up, the stretcher racks are out of the way, and in a word, all-around utility is the chief asset of this type of body. It can be a field ambulance, a motor transport wagon, an offensive machine gun unit, a rear guard unit, a reconnoitering car, or fulfill any duty of ordinary military usage.

On the Buick chassis, which is 1,500-pound capacity, there is mounted a type of body which has been found a great use on the battle fields of France when it becomes necessary to transport quickly ten or a dozen men from one part of the scene of operation to another. It is a sort of open express design which can be provided with armor plate if necessary and carries on the rear platform a machine gun mounting for either offensive or defensive work.

**All-round Utility Vehicles**

A vehicle of this type can dash about from one place to another at a speed of from 35 to 40 miles per hour and with the crew of the machine gun could withstand a considerable attack while the men are performing the work assigned. In other words, a truck of this type could be sent on an expedition such as the blowing up of a small bridge, and while the men in the truck were setting the explosive and arranging the fuse the machine gun could be utilized to hold off the enemy for a sufficient length of time to accomplish the work.

The Cadillac military hospital and armored cars have been described before. They belong to the Northwestern Military Academy of Highland Park, Ill., and are part of the contingent which recently completed a tour to San Francisco. The armored car can attain a speed of 40 miles per hour and is equipped with a revolving gun turret. The present car is equipped with pneumatic tires with the spare tire exposed at the side. In time of service these would no doubt be replaced by solid tires. The military field hospital in its present condition has a machine gun mounting on the rear which, of course, would have to be removed if the car were used for ambulance work. One of the features of this car's equipment are the roller stretchers. These take up so much room that they could not be used to advantage were there wounded men in any quantity.

Autocar transport truck, carrying ten men. The screened compartment in the rear may be used to carry baggage, munitions, or as a guard house for prisoners

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One of the surprises of the camp has been the performance of the 3½-ton Mack truck. This, equipped with demountable armor plated sides, has mounted on its body two machine guns and a 1-pound rapid-fire gun. It acts almost as a land gunboat. On the march to the camp, 400 miles from New York, this truck with its equipment, which weighed up to 8 or 9 tons, was speeded to 35 miles per hour. In addition to its own load, consisting of more than thirty men, the three guns, 15,000 rounds of machine gun ammunition, 12,000 rounds of 1-pound shells, 800 rounds of 3-inch shrapnel for the field piece, two independent searchlight systems, one gas and the other electric, two independent gasoline systems, and the armor plating, this truck towed a limber and a 3-inch field piece of the latest design capable of firing 9,000 yards or over 3½ miles with accuracy.

Autocar officer's reconnaissance car, mounting a machine gun, lined up with other trucks at the camp

### Harveyized Armor Stands Up

The other Mack, of 1-ton capacity, is equipped with pneumatic front and solid rear tires and a platform body upon which are removable sides and a tail piece covered with Harvyized steel armor. This is capable of resisting rifle fire at 500 yards. Just for an experiment the plates were removed and the men opened fire with the machine guns at 200 yards. The hail of bullets failed to penetrate the plate, simply splashing off, but the plates themselves rapidly became crystallized under the vibration set up by being struck blows equivalent to the hammering of 5-ton blows at the rate of over 300 per minute. The result was they soon cracked and fell apart, although at no time did a bullet penetrate through the steel. The steel is guaranteed against rifle fire, however, at 500 yards with the latest steel bullets.

The truck is equipped to carry a Maxim rapid-fire gun and a Colt machine gun with full crews for each of these and 15,000 rounds of ammunition. Both the armor plate and guns can be removed on short notice to be set up in a field position. The bodies on both these Macks have been designed by Alfred M. Masury, chief engineer of the International Motor Co., who spent 3 months making a study of European military motor equipment in Europe. A feature is the tubular centrifugal radiator behind the motor in a steel bullet-proof frame.

On the Simplex 100 horsepower chassis is a body which may be called a machine gun express. This body carries a driver for the car and has just sufficient room for a machine gun and crew. It is capable of speeds in excess of 60 horsepower and can be used to dash into the enemy's line, operate the machine gun for a short time, and then before it can be reached by artillery make a hasty retreat. It is such vehicles as these that have been of great use on the other side for making quick reconnaissances. These cars have to be operated carefully in order that they are negotiated in such a place as to be readily turned around for retreat, and it is the difficulty of being caught in a place where they cannot turn around which has caused the European authorities to set about designing a car which will travel as rapidly in one direction as in another. In other words, geared the same on reverse as ahead and with double steering.

### Standard Chassis With Varied Bodies

The four Autocars have all special bodies which are similar to those now in actual use on the European battle field. These are all on the standard Autocar 2-ton chassis. The officers' reconnaissance car can carry a group of officers on a tour of inspection of the lines or for any service at all where it is necessary to take three or four men quickly along the lines. It fills the place of the officers' horse, doing the work much more rapidly wherever it is possible to remain on the road.

The searchlight truck is the same as that recently engaged in the maneuvers at Fishkill Landing, N. Y. The searchlight sulky attached to the car can be wheeled ¼ mile away from the truck which contains the generator for the electric current. In this way the searchlight can be taken to the brow of the hill while the power plant remains concealed in the valley below.

The motor ambulance is the same as that attached to the Canadian contingent now fighting in Flanders and the military transport is a body intended to convey men to and from headquarters or about different parts of the line. Any of these trucks can be used for transport vehicles, the ambulance having carried twenty-eight at Fishkill Plains besides having had some actual ambulance experience in working over two drowning men who were caught in a stream which

White wireless vehicle, belonging to the Signal Corps, showing 80-foot mast in position, supporting umbrella antenna. Officers in the foreground are making a report on its performance

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The 1-ton Mack with its armor removed

was thought to be fordable. This ambulance has traveled up to 40 miles per hour. It has a water tank underneath with a tap on the rear with room for six prone and eight sitting patients, besides the crew. On the side of the body there is a drawer containing enough surgical apparatus to perform a minor field operation.

**Wireless Truck Owned by U. S.**

One other piece of motor apparatus is at the camp. This is a wireless truck mounted on a White 1½-ton chassis equipped with a special body to take care of this work. This apparatus can be set up for action in 12 minutes and it can send messages 800 miles. The vehicle carries an entire crew and has a generator and complete outfit for sending and receiving wireless messages on the truck. It has a mast for the wireless antennae, which are of the umbrella type. The mast is in nine sections and is 85 feet high. This apparatus belongs to the United States regular army signal corps and has been in use for a little over a year.

At the camp there is endless activity. The officers' and transport cars dash from one point to another, on staff and other duties, the machine gun crews bear down upon imaginary enemies in quickly-moving machine gun express cars, the artillery is pulled over the rough roads by the trucks containing gun crews and ammunition, and all the time the watchful officers are compiling data on the performance of these vehicles.

It has been hard to secure appropriations for adequate equipment for the United States army, small as it is. The aeronautical branch of our service has been practically neglected. It has taken a European war of inconceivable magnitude to awaken the country at large to the knowledge of how far other countries have progressed in military science and equipment while we in the security of probable peace have paid little attention as a nation to these developments.

**Progress Is Being Made**

Out of the preliminary chaos, however, certain definite facts regarding the uses and requirements of military equipment are beginning to stand forth. The best all-around weight capacity is not above 1½ tons except under special circumstances, military transport cars must not be merely converted furniture vans or milk wagons, but must have special bodies which render them of actual use other than mere vehicles upon which a body of men can pile themselves in traveling across country. With machine gun mounting, many of these vehicles can be made to serve as valuable offensive units.

Trucks can be used for towing artillery. With adequate motor-driven apparatus, 100 miles per day is not too much of a journey. The gun squad at Plattsburg traveled 100 miles per day for 4 successive days with twenty machine guns, a 3-inch gun and caisson with limbers for each full equipment for the men, cooking outfit, provisions, and all the paraphernalia necessary.

Special body designs on sturdy, fast chassis will answer the requirements of all-around service far better than miscellaneous trucks picked up here and there. The bodies confiscated on the foreign chassis have proved to be of small utility as compared with those which have been constructed since the war began. The military camp at Plattsburg will go a long ways toward teaching the utility of the machine gun express and transport bodies, the armored truck with artillery mounting and the officers' reconnaisance car. With good roads it is simply a substitution of a 40-mile-per-hour truck for a 15-mile-per-hour horse in battle or a 100-mile-a-day unit for one of 25 miles a day on the march.

Cadillac armored car, machine gun in use

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# Battery Exchange Plan Prompts Motorization

## Central Station's Service Popular With Hartford Users

By William J. Johnson

Concrete guides over hydraulic ram, showing truck on approach

ELECTRICALLY there is a dawn of a new era in Hartford, Conn. Early electrics were handicapped as regards sphere of operation. Batteries were not then what they are today and last but by no means least there was not the system that is now in vogue which has done so much to promote electrical vehicle use in Hartford. Charging in other days was a nuisance, viewed from any angle.

At this writing there are sixty-seven electric commercial vehicles used in Hartford in twenty different kinds of business. Sixty-four of these are General Vehicle make; two are Detroit and one Waverly. The preponderance of G. V.s is due to one cause, the battery service sold by the Hartford Electric Light Co. It may be said in all honesty that Hartford's return to the electric commercial vehicle is due primarily to this enterprising concern.

Because of the preponderance of one make, it may be assumed that Hartford's situation is somewhat one-sided. True it is. Yet Hartford's experience has caused such a favorable impression that almost identically the same system has been adopted in Boston, Worcester and Baltimore.

Electric commercial vehicles are used in the following lines of business: Electric light, grocery and meat, clothing, newspaper agent, ice cream, dye house, express, dry goods, transfer and cartage, wholesale grocery, bakery, rugs and draperies, grain and feed, wholesale drugs, laundry, soda water bottling, milk, coal, lime and cement, biscuits, hardware and wholesale fruit.

### Hauls Not All Short

In these various services Hartford electrics are sent nearly everywhere that gasoline trucks are sent. Vehicles in electric light service often travel 20 to 25 miles from their bases. Grocery and meat service is more strictly local and immediately suburban, whereas wholesale grocery service demands a run of from 10 to 20 miles from the base. Clothing service is for the most part local, operations confined to a 5-mile radius. Newspaper delivery is local, so is ice cream to a great extent, dye house and express, but in dry goods, one de-

Trouble and service truck maintained by Hartford Electric Light Co.

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partment store will not stop at a 20-mile run from the base. Transfer and cartage necessitates runs of from 20 to 25 miles from the city. The bakery service considered here involves delivery of bread to suburban towns 10 to 12 miles from the bakery and often two deliveries a day. Rugs and draperies, grain and feed, wholesale drugs and laundry are city and immediately suburban. Soda water service has proved an eye-opener with a 45-mile round trip on one battery charge. Milk service is interesting in that the home station is 9 miles from the city where deliveries are made. Coal, lime and cement, all handled by one 1-ton vehicle, demand country runs 10 to 15 miles from the home station.

These sixty-four G. V. electrics aggregate from 2,200 to 2,300 miles daily, an average of 36 miles. Up to the first of July, this year, electrics operating under the purchased battery service system had traveled 1,232,967 miles and of this amount 138,000 miles had been traveled before the system was evolved.

### The Battery-exchange Plan

The plan of the illuminating company is simply this: The purchaser secures his truck minus the battery. This is provided by the company on a fixed charge and mileage basis. There are two scales of prices, one in which the cars are charged at the Kingsley street station, or, perhaps more accurately expressed, where the batteries are changed, and the other where batteries are charged at night elsewhere. A user is entitled to as many batteries per day as his service requires, so that, a run of say 100 miles per day is a simple proposition. And there is always a battery waiting. Most of the trucks will average 40 to 45 miles on one charge. Once in a while a car has to be towed in when the battery runs out, but even so the electric light company is present with a service car. The company maintains eighty-seven Edison batteries, 40 of which can be charged at one time. In the winter about 50 per cent of the vehicles change batteries at noon. In the summer only one battery a day is used. The scale of prices is as follows:

750-POUND TRUCK

| | | | |
|---|---|---|---|
| Fixed charge | | | $14 per month |
| Rate per mile | 0 to | 500 | $0.02½ |
| Rate per mile, next 250 miles, 500 to | | 750 | .02¼ |
| Rate per mile, next 250 miles, 750 to 1,000 | | | .02 |
| Rate per mile, excess of 1,000 miles | | | .01½ |

1,000-POUND TRUCK

| | | | |
|---|---|---|---|
| Fixed charge | | | $18 per month |
| Rate per mile | 0 to | 500 | $0.03 |
| Rate per mile, next 250 miles, 500 to | | 750 | .02½ |
| Rate per mile, next 250 miles, 750 to 1,000 | | | .02¼ |
| Rate per mile, excess of 1,000 miles | | | .02 |

2,000-POUND TRUCK

| | | | |
|---|---|---|---|
| Fixed charge | | | $27 per month |
| Rate per mile | 0 to | 500 | $0.03½ |
| Rate per mile, next 250 miles, 500 to | | 750 | .03 |
| Rate per mile, next 250 miles, 750 to 1,000 | | | .02½ |
| Rate per mile, excess of 1,000 miles | | | .02 |

4,000-POUND TRUCK

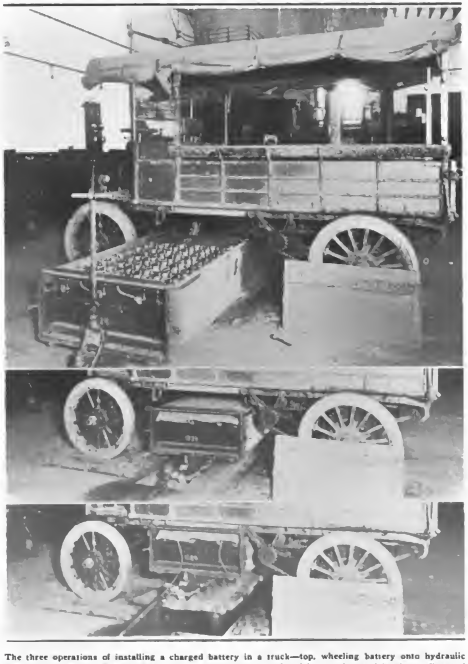
| | | | |
|---|---|---|---|
| Fixed charge | | | $32 per month |
| Rate per mile | 0 to | 500 | $0.04½ |
| Rate per mile, next 250 miles, 500 to | | 750 | .04 |
| Rate per mile, next 250 miles, 750 to 1,000 | | | .03½ |
| Rate per mile, excess of 1,000 miles | | | .03 |

3½-TON TRUCK

| | | | |
|---|---|---|---|
| Fixed charge | | | $40 per month |
| Rate per mile | 0 to | 500 | $0.06 |
| Rate per mile, next 250 miles, 500 to | | 750 | .05 |
| Rate per mile, excess of 750 miles | | | .03 |

5-TON TRUCK

| | | | |
|---|---|---|---|
| Fixed charge | | | $48 per month |
| Rate per mile | 0 to | 500 | $0.07 |
| Rate per mile, next 250 miles, 500 to | | 750 | .06 |
| Rate per mile, excess of 750 miles | | | .04 |



The three operations of installing a charged battery in a truck—top, wheeling battery onto hydraulic ram; middle, battery in position on ram; bottom, ram elevated and battery fastened in place. Removal of exhausted batteries is the exact reverse of this operation

### Plan Is User's Ideal

The writer is reminded of what was once said to him by a man high up in the affairs of one of the big electric car concerns. "When an illuminating company has the agency for a truck, competition is stifled. An individual agent has no chance whatever." Individual electric agents in Hartford have no chance and the one big reason is this battery service system. Before the inauguration of this battery service Thomas G. Mills, proprietor of the Boston Branch, a retail grocery house using a fleet of 11 G. V.'s and one Detroit, said to the writer, "The greatest thing the electric light company, or some other enterprising concern can do is to sell battery service, give a man a battery as often as he needs it at a fixed charge." Mr. Mills said substantially the same thing to Willis M. Thayer, manager of the illuminating company's vehicle department. Mr. Thayer thought

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The battery exchange room of the Hartford Electric Light Co.'s garage, showing two electric trucks over the rams, one having its battery removed and the other having a recharged battery installed. Garage is shown in the background

the matter over carefully and subsequently laid before the president of the company plans for the battery service now in vogue. It was adopted. And it is worthy of note that previous to the inauguration of this battery service plan, June 5, 1912, less than a dozen trucks had been sold. Since then there has been a steady procession in sales. Hartford began a new era of motor transportation with the launching of this system. The result is that the city's foremost business houses are now doing it electrically.

### Buyers' Bonus System

Obviously the more trucks the company has in operation the more revenue is derived, and in order to stimulate sales a bonus system has been devised which applies only to the vehicles sold by the company, in fact, none other can be operated under the system anyway. This bonus is called a special dividend and will be paid January 1, 1916, to all purchasers of G. V.s during the year 1915.

Each new truck sold for the battery service in 1915 receives a sum equal to the total number of trucks delivered by the company during this year multiplied by the dividend for that particular size, with a maximum dividend payable on any one of a given size, as follows:

| Capacity | Dividend | Maximum Dividend |
|---|---|---|
| 750 pounds | $4 | $100 |
| 1,000 pounds | 6 | 150 |
| 2,000 pounds | 8 | 200 |
| 4,000 pounds | 10 | 250 |
| 7,000 pounds | 12 | 300 |
| 10,000 pounds | 14 | 350 |

Thus, the buyer of a 1-tonner, if the total sales for the year equal twenty vehicles, will receive his dividend of $8 multiplied by 20, or $160. If the sales amount to fifty, figured in this way his dividend would come to $400; but as his maximum dividend is $200, that will be the most he will receive.

### What Independents Do

The Kashman Market is using a 1,000-pound Detroit electric and doing its own charging. The service is good. The Lenz bakery is using a light Waverly electric delivery truck that was originally installed by a florist who on acquisition of a gasoline vehicle sold the electric to a dye house. This concern went out of business and another band of cleaners secured it, ownership finally being vested in the bakery mentioned. This vehicle offers a good argument of ability to give service under varying conditions. The service is local with about 35 miles a day average.

Hartford's electrics have proven that winter is no barrier to service, at least insofar as this special battery service is concerned. One of the biggest day's runs ever made by Downing & Perkins was during the Christmas holidays when practically 2 days' work was done from the time the truck left in the morning until it was garaged at night. At the present time a day's work with Hartford's electrics is from 40 to 70 miles. The highest mileage, 88 miles, was obtained by one of the company's trucks working for Downing & Perkins and carrying the mail.

### How Battery Service Is Handled

All batteries are kept and charged at the Kingsley street station. Trucks are run in from the street directly over a hydraulic hoist which consists of a very heavy wood platform which has a hoist under each of the four corners.

### Batteries Steam-cleaned

The batteries are kept in the charging room a half-story lower than the main building. For cleaning off the batteries steam is used, this being generated in a vertical boiler in the main building. The batteries are raised from the lower to the upper level by means of a hydraulic elevator. Three-wheeled conveyors are used. When a truck comes in to change the battery one of these conveyors is placed under the battery and is raised with the hydraulic hoist until the battery is free from its cradle when it is unhooked and the platform lowered. The operation is simply reversed for replacing a battery. A record is kept of the arrival and departure of trucks and mileage. All batteries are numbered.

The trucks are stored on the owners' premises. A subsidiary of the illuminating company conducts an electric garage on north Main street where electrics are stored, washed and repaired as the owners may direct.

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## Vehicle Battery Service

CHARGING SERVICE has been perhaps the greatest need, the failure to supply which has obstructed the progress of the electric vehicle. This fact has been recognized long and has been the subject for much earnest and amiable discussion in both electric light and electric vehicle circles and all have agreed that something should be done to make it easy for the owner of an electric commercial vehicle to secure his supply of current—but unfortunately for several years the matter has gotten little farther than conversation about what ought to be done.

New England has come to the fore, with characteristic dignity and wholly without preamble, with battery service in concrete form. First in Hartford, Conn., and then in dear old Boston itself, the central stations have come forward with a practicable, workable scheme by which electric vehicle owners may have their vehicles supplied with full-charged batteries in exchange for exhausted batteries much after the fashion of the acetylene gas tank at a small charge and without delay.

When most of us first heard about it, it was actually in practice and it was a success. It appears that the scheme is an exclusive affair and only two companies, one vehicle builder and one battery maker, were included in the plan. With alarm those left out in the cold have banded themselves into a committee to urge a broader policy on the part of the central stations.

The Electric Vehicle Assn. has been watching developments in Boston with a far-seeing eye to the future and to the national significance of the downeast experiment and the teapot tempest raised. At the Cleveland convention of that body to be held next October this subject has been accorded a prominent place on the program and it gives promise of being one of the most important topics.

There may be justice in the contention of the originators of the scheme that as the ones who have taken the bull by the horns and done the thing, while the others repeated platitudes, they are entitled to the profit it yields, and there may be injustice on the part of the central stations involved in barring out competing makers from the service which logically they alone can give, but it is to be hoped that the lethargy of the electric vehicle industry and the appalling inertia of the central stations in failing to take advantage of the market for current offered by the electric vehicle, will be abandoned.

Strife in the ranks, if that must prevail, may succeed more than the long-standing harmony of inaction, in galvanizing some life into the electric vehicle business.

## Good Roads and Preparedness

EUROPE'S example has made the United States awaken to the value of motor trucks in warfare, with the result that the national authorities are making every effort to make up the deficiency which this country suffers in the way of motor military equipment. General Wood suggests a motor militia. The war department has a number of trucks in service on the Texas border and has recently sent a few to Haiti. General Funston has asked for more to aid in the rapid transportation of troops along the Mexican border.

The Senate has been conducting quiet inquiries for some time relative to the available supplies of motor trucks suitable for use in case of war and of the capacity of the factories for emergency production.

Thomas A. Edison has added a new thought to the discussions, however, in pointing out the strategic deficiency, especially along our various and extensive coasts and borders, in good roads and bridges, suitable for the passage of large bodies of troops and all their heavy wheeled equipment.

America's first motor artillery troop has been organized and has gone into camp at Plattsburg, N. Y., having toured 400 miles from New York City to reach there. It has demonstrated the truth of the statement of the Wizard of Menlo Park, taking 4 days to make a 2 days' run, owing to weak bridges.

There are 465 miles of government-built post roads in the whole land. These roads are of a high order and well suited to military purposes, but they are widely scattered and form no continuous strategic whole. Wherever they have been laid, according to official statements, they have increased the prosperity of the farmers and towns along them; they have increased public and high school attendance and they have greatly increased the use of motor commercial and passenger vehicles.

Good roads are among the most essential features of successful military operations. It is good roads that have enabled the Germans to move with such amazing rapidity and to keep their enormous troops constantly supplied with food, supplies and ammunition. It is the lack of means of rapid and flexible transportation, among other things, which has so crippled the Russian bear, whose men and equipment were rendered ineffectual against the highly-organized Teuton onslaught by being insufficiently supplied.

For peace or war, Good Roads should be the slogan.

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# HE'S ALWAYS ON THE JOB

GOOD judgment; an inclination for hard work with a healthy body able to stand the punishment of long hours; and a mechanical engineering education are the attributes which have enabled Clinton Bretell to make a success of the Motor Haulage Co., New York City. That concern, formed in July, 1914, a little more than a year ago, contracts to haul bulky materials such as coal, rolled paper, stone, cement, rock, asphalt, etc., by motor trucks.

Bretell, a New Yorker graduated from Columbia University in 1910, went to work in the shops of one of the large American motor truck manufacturers after leaving his Alma Mater. By dint of hard work, he pushed his way through the shops to have charge of testing the trucks of his company before they were delivered to the purchasers. Then he was promoted to the sales organization of the same company—also the result of hard work. This covered a period of 3 years. At the end of that time he was well acquainted with the mechanical construction of a motor truck. He was also well acquainted with its proper method of operation.

He then returned to New York City and formed the Motor Haulage company in partnership with Ralph H. Matthiessen, another mechanical engineer graduated from Yale Sheffield School in the class of 1911, and purchased two 6-ton trucks.

Matthiessen is the money man of the company and Bretell the operating chief. While the former purchases the supplies, handles the money and keeps the books, Bretell is responsible for the care and operation of the trucks and for their being on the job every day so that the work they are doing can be finished on time.

With the work of the company thus clearly defined, both youngsters, for Bretell is only 27 years old and his partner less, went out to find work for their trucks.

Their first job was hauling road-building material for a contractor building some county roads just outside of the Metropolitan district. Bretell watched his trucks on this job like a cat does a mouse. He was always on the job. He used his judgment in quoting a price for the work and by close attention to details, made money.

Most of the work so far done by Bretell's company has been hauling road-building material. This work, when properly handled, is highly lucrative if taken on a contract basis with a responsible firm. Judgment must be used in selecting the jobs and the character and standing of the contractor must be investigated. Bretell has also found that the price to be quoted on each job must be calculated separately and not determined by comparison with former jobs of a similar nature.

This was brought home to him very strongly in one case where he contracted to haul several hundred thousand paving bricks on a weight basis, the bricks being represented to weigh so much apiece. Certain loading facilities were understood to exist. He took both of these conditions for granted as represented and quoted a price for doing the work. On his first trip to the job on the day which it started he found that inferior loading facilities existed and that the average weight of the paving bricks was double that understood by him. Because these conditions were not specified in writing, he had to go through with the job at the price originally quoted with the result that his profits were eaten up.

Bretell has found that there are many openings for the use of trucks by local road builders except in the winter months when outside work generally shuts down due to the freezing temperature. Many of the smaller contractors find it much cheaper to hire trucks to haul their material than to buy them themselves because of their idleness during the winter months. Also, because the ordinary contractor, while he may be an expert in handling a small steam locomotive, a hoisting crane or a derrick, he is not generally a motor truck expert, and it needs a motor truck expert to keep motor trucks running day in and day out in the contracting business. The abuses to which a motor truck in this line of endeavor must be subjected, make it mandatory.

Bretell knew this before he formed his company. He was prepared for it. He circumvented delays and breakdowns by being always on the job and paying strict attention to all details. He knows his trucks and by being on the job and using his judgment in making repairs, is able to keep them running when necessary.

By handling his vehicles in this manner he was able to make good on what jobs he already had and to secure others so that in May of the present year he purchased another 6-tonner to take care of the increase in work. Others will be purchased as general business conditions better themselves and projects on which he has optional contracts are begun.

The present trucks are all engaged in road-building work during the spring, summer and fall months and in the winter in hauling bulky material such as coal, etc. It is the purpose and aim of the company to secure contracts for hauling such material on a yearly basis as this will provide a certain minimum amount of work to be done all year 'round. The contracting work, while more lucrative than the former class, is more uncertain and more irregular, generally a great rush one month and a slack another. By this system of depending on the yearly contract work, the contractors' hauling

(Continued on page 17)

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# Wood Would Muster Motor Militia

## Each Make of Vehicle Would Have a Training Camp

PLATTSBURG, N. Y., August 16—Gen. Leonard Wood, U. S. A., in an interview here with a representative of one of the New York newspapers, expounded a plan for the organization of motor vehicle owners for military defense. The plan of the commander-in-chief of the U. S. Army, based on long experience with older forms of transportation and in the various experiments which the government has made with motor equipment, contemplates the organization of military instruction camps in all parts of the country, to which the millions of motorists would go with their vehicles and receive instruction from regular army officers. Gen. Wood advocated that the different motorists be grouped according to make of car rather than geographically, as uniformity of mechanical details is of great importance in the strenuous service of the battlefield.

Each car sent to such a training camp would be accompanied by its owner or his representative and several additional men, according to the passenger capacity of the machine, so that for every few hundred vehicles there would be a regiment of men. Transport trucks, armored scouting cars, ambulances and machine guns would be assigned to each motor regiment.

Gen. Wood made a special plea for standardization of motor truck parts, and especially of tire sizes. He also urged that road commissioners see that all bridges on main roads be of sufficient strength to sustain the weight of heavily-laden vehicles, pointing out that, through no fault of the vehicles, the motor gun troop which ran the 400 miles from New York City to Plattsburgh required 4 days for the trip because of the frequent detours necessary to avoid weak bridges. Many of these had to be bolstered up and some completely rebuilt before the heavy apparatus could make the passage safely.

It has been found that the field guns which were towed by the motor trucks suffered from the vibration induced by their steel tires, while the men who rode on them found it exceedingly fatiguing as well as difficult to cling to their seats. Rubber tires will have to be fitted to both guns and caissons for motor service.

### ARMORED CAR TROOP PLANNED

NEW YORK CITY, August 17—Members of the Automobile Club of America have been discussing a plan to organize a detachment of armored motor vehicles. Suggestions of the plan have been brought to the attention of Major-Gen. Wood.

### HONDURAS NEEDS TRUCKS

WASHINGTON, D. C., August 25—Two 5-ton trucks have recently been ordered by a firm in Tegucigalpa, Honduras, Central America, the capital of that republic, and there are prospects that more vehicles will be purchased in the future.

Tegucigalpa is located 88 miles from La Union, the Pacific port of Salvador, and it gets most of its goods by ox carts from that port. They are used only to bring goods from the coast, there being return loads only very rarely.

The roads are good macadam except about 10 miles on sea level, where the road becomes muddy in the rainy season, 5 months in the year. The road is a gradual up-grade to a 5,000-foot elevation and then a drop to 3,200 feet. The maximum grade is 9 per cent and most of the grades are 5 per cent.

One ox-cart with two oxen will haul 1 ton and requires 6 days to make the trip one way. They haul the goods for from 75 cents to $2 per 100 pounds, or from $15 to $40 per load.

Individual firms are making inquiries of Consul Lawton for trucks to haul these loads, consisting of general merchandise. They are interested in 5-ton trucks or lighter trucks with trailers carrying the same total load. They are able to pay cash, but must have a complete vehicle with a body, as there are no facilities there for the construction of bodies.

### PROTESTS BRITISH AD.

WICHITA FALLS, TEX., August 20—A. R. Grundelle, formerly advertising manager of the Commerce Motor Car Co., Detroit, and now sales and advertising manager for the Wichita Falls Motor Co., builder and exporter of Wichita trucks, has addressed a protest to one of the English motor truck publications against an advertisement on its front cover reading:

"You won't buy an American lorry when Britishers can be had again. Why buy one now?"

Mr. Grundelle states that it is unfair for the publication to print negative statements of this character inasmuch as the publication is largely supported by American advertising. He states: "We appreciate competition, depreciate petition."

### Coming Commercial Vehicle Events

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| Sept. | Peoria, Ill., Second Northwestern Road Congress. |
| Sept. 13 | Oakland, Cal., Pan-American Road Congress. |
| Sept. 14-17 | Kineo, Me., New England N. E. L. A. Convention. |
| Sept. 15 | Whitestone Landing, L. I., Outing Motor Truck Club of America. |
| Sept. 20-25 | San Francisco, Cal., International Engineering Congress. |
| Sept. 24 | Indianapolis, Ind., S. A. E., first section meeting. |
| Oct. 4-14 | Wichita, Kan., Motor Exhibition, International Wheat Show. |
| Oct. 6-16 | New York City, Electrical Exposition & Motor Show, Grand Central Palace. |
| Oct. 11-12 | Dayton, O., National Paving Brick Mfrs.' Assn., annual meeting. |
| Oct. 14 | Chicago, S. A. E. Standards Committee Meeting. |
| Oct. 18-19 | Cleveland, O., Convention Electric Vehicle Assn. of America, Hotel Statler. |
| Oct. 19-20 | Detroit, Mich., Safety First Convention, Safety First Federation of America. |
| Nov. 29-Dec. 4 | Electrical Prosperity Week. |
| 1916 | |
| Jan. 29-Feb. 5 | Columbus, O., Motor Vehicle Show. |
| Jan. 29-Feb. 5 | Minneapolis, Minn., Motor Vehicle Show. |
| March 4-11 | Boston, Mass., Motor Vehicle Show, Mechanics' Hall. |

# Edison Would Have Military Roads

## Strategic Routes Should Be Prepared for War

ORANGE, N. J., August 20—Thomas A. Edison has come out strongly for improved roads and bridges as a means of insuring quick movements of troops in case of war, even at Federal expense. Mr. Edison is quited as follows:

"I should go beyond the mere providing of men and munitions, and I would have the government revamp the country on a strategic basis; for instance, the government ought to build a system of military roads along the seaboard and take charge of all roads which have a strategic value, put them and keep them in splendid condition, reduce the grades, widen them where necessary and strengthen the bridges for the passage of the artillery and heavy trucks.

"I cannot overstate the value of good military roads; the railroads have nothing like their elasticity. Given roads and plenty of motor vehicles, 1,000,000 men, with artillery and supplies, could be shifted 200 miles in 24 hours. There is nothing like a motor vehicle on good roads for the rapid transportation of men and materials."

### 465 MILES OF U. S. ROADS

WASHINGTON, D. C., August 29—In a bulletin issued here by the Office of Public Roads of the U. S. Department of Agriculture, it is pointed out that up to the present time 465 miles of experimental public roads have been laid by the government for experimental purposes, as authorized under Act of Congress of August 24, 1912. The manner in which this is justified is that the roads are laid along the postal routes, and are paid for out of the appropriation of $500,000 for the Post Office Department to improve rural free delivery roads. The government pays one-third the cost of such roads and the states the remaining two-thirds.

### WAR TRUCKS TO HAITI

NEW YORK CITY, August 27—When the U. S. S. *Tenn se* left for Haiti from the Brooklyn Navy Yard yesterday she carried upon her decks a number of motor trucks belonging to the Quartermaster's Department which will be used in land operations in the Caribbean republic.

An appeal for four motor trucks from Gen. Funston on the Texas border has been received in Washington, to be used in rushing troops to scenes of disturbance. The U. S. regulars already have a number of trucks on the border in Quartermaster work, but these can be ill spared for rapid transport of troops across country.

### SCOTCH MOTOR PLOW TRIALS

WASHINGTON, D. C., August 24—Consul Fleming at Edinburgh, Scotland, has advised the Department of Commerce that trials of motor plows are to be held near Stirling the first week in October. These trials will be held under the direction of the Motor Trials Committee of the Highland Agricultural Society, George IV Bridge, Edinburgh, Scotland.

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# Detroit 750-pounder $690 Complete

## Conventional Design in New Light Delivery Car

DETROIT, August 26—The Detroit Commercial Car Co., this city, has brought out the Detroit light delivery car to sell at $690 complete. It is a standard product, having a four-cylinder block motor, 3¼ by 4, coupled direct to the gearset in a unit power plant and driving the axle by spiral-bevel gears. It is mounted on pneumatic tires with cantilever springs in the rear and a wheelbase of 106 inches. Its capacity is 750 pounds and three styles of bodies are offered. Tires are 30 by 3½ and a single-unit electric lighting and starting system is applied. Deliveries will start some time in September.

### NEW MOTOR FLUSHER

MILWAUKEE, WIS., August 26—The Kindling Mfg. Co., of this city, maker of horse-drawn motor street flushers, sprinklers and cleaners, is bringing out a motor-driven washer which has been tested by the street department of the City of Milwaukee. It consists of a standard motor truck chassis mounting a large water tank.

A sprinkler in front flushes the street and a revolving rubber squeege mounted in front of the rear axle scrubs the pavement.

### WARE NOW TWIN CITY

ST. PAUL, MINN. August 25—The Twin City Four Wheel Drive Co. has bought the patents of J. L. Ware on the four-wheel-driven motor truck of that name, which has been manufactured here for several years past. The new company has a capital of $500,000.

A three-story office and factory building is to be erected at once. J. L. Ware is president of the concern, T. J. McDermott, vice president; F. J. Drew, treasurer, and M. T. Roche, secretary and general sales manager. The trucks will be ready for the 1916 market, according to plans.

### DRIGGS-SEABURY ORDNANCE CO. FORMED

NEW YORK CITY, August 23—The Driggs-Seabury Ordnance Co., incorporated in Delaware last week with $4,000,000 capital stock, will take over the control of the old Driggs-Seabury Ordnance Corp., makers of Vulcan trucks. The company's capital consists of $500,000 first preferred stock, $500,000 second preferred stock, and $3,000,000 common. It is understood that the common stock will be put on the curb today by Herrick & Bennett. The preferred stocks will not be offered to the public.

The new company will take over the entire plant and assets of the corporation and will at once resume the manufacture of trucks and war munitions and will take over the manufacture of about $600,000 in truck parts, contracts for which were held by the corporation.

A. E. Borie, formerly vice president of the Bethlehem Steel Co., is slated for the presidency of the newly organized company. Strong New York interests, among which is the banking firm of Wm. Morris, Imbrie & Co., are connected with the new organization. The board of directors have not been announced, but the operating end of the business will be in the hands of former officers of the Bethlehem Steel Corp. The latter company states that it is not trying to buy out the Driggs-Seabury Ordnance Co., as rumored.

Mr. Borie held a conference in Sharon, Pa., last week with John Stephenson, Jr., who retains his interest in the newly organized concern, regarding the transfer of the property. Plans for big extensions at the Sharon plant will be taken up at the meeting of the directors the first week of September. It is reported that the corporation has orders for war material aggregating $30,000,000.

### NEW $3,000,000 WHITE STOCK

CLEVELAND, O., August 19—The White Co. of this city will shortly issue $3,000,000 additional stock to cover plant extensions. The present capitalization is $500,000 preferred and $2,400,000 common. The preferred stock will be retired at $115 a share immediately, plus accumulated dividends up to November 1, 1915. The new issue will pay 7 per cent and will be absorbed by the present stockholders.

### SMALL WAVERLEY TRUCK COMING

INDIANAPOLIS, IND., August 17—It is stated on good authority here that the Waverley Co. of this city will in the future announce an electric commercial model of light capacity at a lower price than heretofore Waverley vehicles have been offered.

### G. M. C. IS PROSPEROUS

DETROIT, August 13—W. L. Day, vice president and general manager of the General Motors Truck Co., has reported that his company has orders for 500 trucks and that the number of unfilled orders on the books is the greatest in the history of the concern, greater, in fact, than the total number shipped in any previous year except the fiscal year just ended. A net balance of $250,000 is in the treasury and 100 men are being added to the working force.

### YUSTER + TORBENSEN = COLUMBIA

CLEVELAND, O., August 24—Having recently moved its offices and factory from Newark, N. J., to Cleveland, O., the Torbensen Gear & Axle Co., manufacturer of the Torbensen internal-gear-driven truck axle, has combined with the Yuster Axle Co., of Cleveland, the amalgamated concern being known as the Columbia Axle Co. The change of name was made because of the withdrawal of M. L. Yuster from the organization.

Both Yuster, now Columbia, and Torbensen axles will be manufactured as heretofore and in the same shop. Plans are being made for the addition of facilities and machinery to the plant with a view to increasing the combined output.

# Truck Clearing House for New York

## Brooks Will Represent Out-of-Town Makers

NEW YORK CITY, August 23—Emerson Brooks, formerly vice-president of J. M. Quimby & Co., Newark, N. J., and more recently interested in the motor truck field, has evolved a plan of operations which should be of value to the industry. In addition to the regular representation of one truck company, he has adapted his office to act as a sort of clearing house for companies which have no metropolitan agents. By such arrangement he makes it possible for out-of-town concerns to arrange deliveries through his office and also to have catalogs and literature to file there. THE COMMERCIAL VEHICLE, in its January issues, published tabulated statistics of 370 makes of trucks, many of them not represented in New York, and this new plan should prove a convenience to them, as well as a source of profit. Mr. Brooks is well known in the truck industry, having served two terms as vice president of the Motor Truck Club and one year as treasurer of the Automobile Club of America. His office is at 250 west Fifty-fourth street, New York City.

### U. S. RUBBER IMPORTS GROW

WASHINGTON, D. C., August 20—Crude rubber shipments from the principal South American ports have shown an increase of 2,143,076 pounds for the year ending June, 1915, over the year previous, most of which surplus was imported by the United States, according to the report of George H. Pickerell, consul for the United States at Para, Brazil, to the Department of Commerce.

The total rubber shipped from the three chief rubber ports of the Amazon valley was 5,192,260 for the year ending June, 1915, as against 3,049,184 for the year previous. Of this total the United States took 3,088,114 and Europe, 2,104,147. The year previous the United States took 1,035,396 and Europe, 2,013,788; so that while the United States has increased its imports nearly threefold, Europe has stood practically stationary.

The three ports included in these figures are Para, Manaos and Itacoatiara. Para shipped more than two and one-half times more to the United States than to Europe, Manaos shipped the greater part of its output to Europe and Itacoatiara shipped all of its rubber to Europe. Para ships nearly three times the amount of rubber that the other two combined do.

### NEW HURLBURT PLANT

NEW YORK CITY, August 27—The Hurlburt Motor Truck Co., New York City, which has manufactured the Hurlburt worm-driven motor truck at its Fort George factory for more than 2 years, has found expansion of its facilities necessary and accordingly has secured the old plant of the J. L. Mott Iron Wks., on Mott Haven Canal, the Bronx. It is stated that the company has orders for over 1,000 trucks to be used as Red Cross ambulances in Europe.

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# New Michigan Law In Effect January 1

## Statute Puts Horsepower and Weight Tax on Trucks

DETROIT, August 16—The new Michigan Motor Vehicle Law has been issued in booklet form by the Secretary of State of Michigan and goes into effect January 1, 1916. The sections affecting motor trucks require that they be registered annually, each license to be good for 1 year only, expiring December 31 of each year. When registration is made after September 1, half-rate is charged. The number plates are two in number, to be displayed front and rear, and are changed annually in color. The truck owner is required to carry the customary lighting equipment so arranged that the tail light illuminates, with a white light, the license plate. Dimmers are required on the front lights.

The fees for motor trucks are 15 cents per horsepower plus 15 cents per 100 pounds of weight, if gasoline or steam, or 50 cents per horsepower plus 25 cents per 100 pounds of weight, if electric. A 3-ton, 25-horsepower gasoline truck, weighing 2,500 pounds, therefore would have to pay $7.50 license fee per year. An electric truck of 5 horsepower, weighing the same, would have to pay $8.75.

Reciprocation is provided, but not unless the home state reciprocates, and not in the case of "non-resident corporations doing business in the state."

### ST. LOUIS TO BAR HORSE

ST. LOUIS August 14—Horses are to be barred from Locust street west of Eighteenth street if the police department follows the advice of the director of streets, who has finished an investigation of traffic conditions. Locust street is the principal motor thoroughfare of the city.

### TRUCK CLUB OUTING SEPT. 15

NEW YORK CITY, August 18—The annual outing of the Motor Truck Club of America will be held on September 15 at Duerr's Pavilion, Whitestone Landing, L. I., and will be the fourth annual field and ladies' day of the organization.

Arrangements have been made for the party to make the trip from one of the accessible East River piers to the grounds on a large steam lighter specially prepared for the voyage up Long Island Sound. Tickets this year will be $3 for gentlemen and $2 for ladies.

The arrangements are in charge of a committee whose active chairman is F. Nelson Carle, of the General Vehicle Co.

### TRUCK TOPICS AT FRISCO ENGINEERING JUNTA

SAN FRANCISCO, CAL., August 19—At the International Engineering Congress to be held here September 20 to 25, 1915, three papers related to the motor truck industry are to be read. This congress, which will be held under the auspices of five engineering societies, namely, the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, the American Institute of Electrical Engineers and the Society of Naval Architects and Marine Engineers, will be held in the Auditorium building, Civic Center, Hayes, Larkin and Market streets, San Francisco.

On Thursday, September 23, afternoon session, B. F. Cresson, Jr., Mem. Am. Soc. C. E., will present a paper on "Railroad Terminals." Mr. Cresson is recognized as a national authority on freight terminals and is a member of the New Jersey Harbor Commission, Jersey City, N. J.

Friday, September 24, in the morning session, "Motor Vehicles: Utility Type," will be presented by Arthur J. Slade, Mem. S. A. E. and Am. Soc. Mech. Eng., and "Motor Tractors" by F. S. Davis, of the International Harvester Co., Chicago.

### RIKER AND COFFIN, S. A. E. MEN ON DEFENSE BOARD

NEW YORK CITY, August 19—Andrew L. Riker, president of the Locomobile Co. of America, Bridgeport, Conn., and Howard E. Coffin, of the Hudson Motor Car Co., have been selected by the Society of Automobile Engineers as representatives of the motor vehicle industry on Secretary Daniels' Naval Defense Board. Both engineers are past presidents of the S. A. E. Mr. Riker produced the first Riker electric truck in 1894. He was awarded a medal for meritorious motor vehicle design by the French government in 1900.

### INDUSTRIAL TRUCKS FOR CANAL

NEW YORK CITY, August 19—For the terminal piers at the Panama Canal in Christobal, four electric industrial tractor-trucks have been purchased by the Panama Railroad Co. of the Buda Co., Chicago. These four are but the forerunners of large installations that will be made upon the approval of the work of the first four.

Each of the four is equipped with three trailers by which it is able to haul great tonnages. Eight more electric stevedores are to be purchased by the New York agent for the Panama railroad, these to be of the crane type, which will be able to dispense even with the small amount of human labor necessary to load and unload the electric industrial trucks.

### CO-OPERATION EFFECTS ECONOMY

KANSAS CITY, MO., August 24—Several of the grocers of Hutchinson, Kansas, have combined their delivery departments into a co-operative delivery system employing four motor trucks. Formerly, when each merchant operated his own equipment, forty horse wagons were required to do the same amount of work that these four co-operatively-operated vehicles are accomplishing.

In Lawrence, Kansas, a merchants' delivery system has been organized by A. C. Crawford, J. A. Miller and Mack Miller, of Ottawa, Kansas, similar to an installation which they established in Ottawa recently and sold to other parties. The Lawrence outfit operates two motor trucks and eleven horse wagons, twenty-five horses being employed. So far the company has confined itself to the grocery trade.

# Hub Electric Men Protest Battery Plan

## Think Central Station Should Give Uuiversal Aid

SINCE the Boston Edison Co., the General Vehicle Co., and the Electric Storage Battery Co. established the battery service system in Boston, under which electric truck users may purchase vehicles without batteries and buy battery service with interchangeable batteries at a fixed charge, changing batteries in a few minutes and being rid of all battery maintenance bother, makers of other electric vehicles and batteries have been greatly disgruntled, deeming this action by the central station unfair to them, and, through the stifling influence on competition which it is said it will have, harmful to the electric vehicle industry at large.

Accordingly a committee of nine representatives of electric vehicle, battery and charging outfit manufacturers has been formed and has inaugurated an active propaganda against central stations tying themselves up with individual manufacturers instead of giving battery service to users of all makes of battery or vehicle.

The arrangement in Boston is similar to that effected in Hartford, Conn., and was brought about by the failure of electric vehicle interests to effect any tangible improvement in service conditions surrounding the use of electric trucks. Wearying of waiting for something to be done, the three concerns agreed to jointly offer the public the sort of charging service that was needed irrespective of the action of the rest. The vehicle maker is perhaps the largest in the field while the battery concern is the largest in the lead class.

That the Boston Edison Co. has not offered the service to other makes is due to the fact that it was only by the co-operation of the other two concerns that the service system was made possible and to the lack of standardization of batteries, their grouping, their location on the chassis or their method of attachment.

An open circular letter has been addressed by the Boston committee, which as yet is unnamed, to all the principal central stations in New England. Following are the principal statements made:

1—You will admit at the outset that in order to put the use of electric vehicles on a sound and permanent basis, it is essential that every economy possible of attainment from their use be made available to the present or prospective user. No other policy can insure success.

2—It is a recognized fact that the transportation of merchandise can be done with economy by horses, gasoline trucks, or electric trucks. That a proper selection of the

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# He's Always On The Job

## How Bretell Keeps His Trucks Working Efficiently

(Continued from page 13)

work may become a well-paying side issue to keep all of the trucks busy for the entire year.

Bretell found the driver problem one of his greatest perplexities. With his trucks hauling material out in the country, quite a distance from the nearest repairshop or garage, he found that he should have at least one of the drivers who could be depended upon to make repairs quickly. On such jobs as were more than 100 miles from the office, the trucks were maintained at the nearest garage or kept under sheds near the work.

If more than one vehicle is working on such jobs, one of the drivers is responsible for the care and maintenance of all the trucks. This centers the authority for their proper operation. One of Bretell's drivers of this class is paid $4 per day, which is considerably above the average wages paid. This man can be depended upon to oversee the job in his absence, and as the business increases will become his first assistant or be put in charge of all the vehicles, no matter where they happen to be operating.

Those drivers who are only expected to drive the trucks and make such minor adjustments as become necessary during the course of the day are also paid well, and for this reason Bretell is able to get the pick of the capable men. He treats them as he would treat himself; listens to any suggestions they may have to make and thus makes them respect him.

Each driver or the straw-boss in charge of the trucks on any job must report to him by telephone at least once a day if he does not visit the job that day. Each driver must also make out a daily report showing the number of trips, the tonnage hauled the gasoline and oil used and the reasons for any delays. This, with his personal supervision, enables Bretell to keep in the closest possible touch with all his vehicles.

To aid him in personally supervising each job, Bretell bought an inexpensive runabout. This enables him to get from one job to the other in the shortest possible time and is also of great value for rushing spare parts to any vehicle which has become disabled.

The motor haulage business is by no means a get-rich-quick scheme, according to Bretell, but it does offer good profits provided one knows his trucks and what they can do; uses his judgment and is always on the job.

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correct method of haulage depends upon an intelligent study of the individual case is self-evident. Any such study will quickly reveal that in many cases the margin of saving from the use of either the gas or electric truck in preference to the horse, is small and frequently intangible to a prospective user of gasoline or electric trucks.

3—If the selection of the type of delivery equipment best suited to serve the needs of individual customers varies with conditions, it must be admitted that the method of operating the selected equipment is one the less open to investigation and must also be considered carefully in connection with the equipment selected and operation required.

4—Recollect that electric vehicles can be operated with economy either by the use of a battery exchange system or individual charging boards, and here again the better of the two methods must be determined by an analysis of the prevailing of expected conditions. It is also important to remember that with the standardization of both of these methods of charging, the Central Station is in a position to meet every application with its proper solution, resulting in a larger profit than if either method is advocated to the complete or partial exclusion of the other.

5—It is obvious that the slowness of the public in general to adopt the electric truck in any fair proportion to its advantages is due mainly to popular impression that anything electrical is actuated by some mysterious power capable of control and in the cases where storage batteries are concerned, of replenishment only when handled by men specially versed in the art.

Let the public served by you realize that you are using and can honestly recommend electric vehicles. Establish two general methods of charging: first, offer a battery exchange plan, open on the equal terms required of a public service corporation to any applicant; second, by means of individual charging boards owned and operated by your customer. Also establish a bureau of information for present and future users of electric vehicles in your territory, from which bureau information helpful to the trade should be issued to it simultaneously and with exact impartiality.

Consider briefly the plan presented above. First, it states that you are to use and recommend electric vehicles where proper to do so. Surely no hardship is imposed by such a requirement. Can any manager grumble at double profits secure from the modern tendency of rate reduction?

Next, establish two general methods of charging. Why not establish and encourage as many different methods as will serve electric vehicle users to their profit and satisfaction, thus increasing the permanent revenue of the central station and enabling it to build up its off-peak load at a fraction of the effort expended at present to fill up the valleys in the load curve? And what is there new, novel or exacting in either of the general schemes of charging proposed under this plan?

The battery exchange plan is old; it is now available with equal facility for any make of truck, owing to the use of universal battery compartments by all the leading makers of vehicles and standard battery dimensions have long ago been realized within easy working limits. This plan of charging presents no difficulties to the central station and its adoption as a stimulus to the industry will be beneficial indeed, especially as public service officials will realize, without the necessity of illustrative examples, the prime importance of preventing the public from gaining the impression that the central station can or will favor special interests.

The handicaps of individual charging have been removed with the perfection of the batteries and introduction of simpler and fool-proof control equipment. Such individual charging installations should always be advised by the central station when prevailing conditions make it possible for the used to avoid the overheads of the battery exchange or mileage plan of service. And to follow such a plan means more revenue for the central station, resulting from the sale of current, minus extras; i. e., gives you the maximum possible profit, and automatically brings the user nearer to the economic ideal. Indorsement of the charging at home plan will offset the inference created by the establishment of a universal battery exchange, that electric vehicles are still in the infantile stage and require trained nurses,—and thus make it possible for the central station to furnish this double service without the possibility of inadvertently destroying the paramount simplicity argument of the electric vehicle salesmen.

And finally, the wisdom of bureaus of information maintained by central stations to capitalize their local prestige is unquestioned today. The civic trend of modern times makes it as foolish as it is futile to attempt to develop any great instrument or institution of public service along the lines which savor of favoritism or monopoly.

A representative committee is ready to assist you in the perfection of the plan outlined above.—M. E. Brackett, chairman.

Committee:

Floyd T. Taylor, district sales manager Cutler-Hammer Mfg. Co.
R. B. Daggett, manager New England district Commercial Truck Co. of America.
P. E. Kelley, manager Boston office Philadelphia Storage Battery Co.
George W. Holden, New England manager Edison Storage Battery Co.
W. E. Haseltine, assistant general manager Holtzer-Cabot Electric Co.
John A. White, New England manager United States Light & Heating Co.
M. O. White, Boston manager Ohio Electric and Ward Electric Truck.
J. W. Emery, New England manager Walker Vehicle Co.
M. E. Brackett, Boston branch manager General Motors Truck Co.

# E. V. A. Convention Program Out

## Exhibits and Vital Topics Planned for Cleveland

CLEVELAND, O., August 23—Plans for the annual convention of the Electric Vehicle Assn., to be held at the Hotel Statler here on October 18 and 19, are rapidly being matured. It is expected that exhibitions of electric vehicles, batteries and accessories will be held, M. R. Berry, chairman of the Exhibition Committee, care of the Electric Products Co., 10674 Du Pont avenue, Cleveland, O., having this portion of the convention in charge.

The program, according to tentative plans, will be as follows:

"Electric Industrial Trucks in the Service of the Pennsylvania Railway Company," by T. V. Buckwalter.
"The Electric Taxicab," by J. S. Scrimger.
"The Hartford Electric Co.'s Experience With the Battery Maintenance and Battery Exchange System," by Samuel Ferguson.
"The Function of the Electric Garage," by R. Murray.
"Comparative Development of General Power and Commercial Electric Vehicle Loads and Function of Power Salesmen as Electric Vehicle Solicitors," by H. B. Holding and S. G. Thompson.
"Problems We Are Facing and How They May Be Met," by G. H. Kelly.
"Field for the Small Electric Delivery Vehicle," by Charles A. Ward.
"Electric Vehicles in Municipal Service," by Arthur J. Slade.

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# Motor Mules Move

## Tractor-semi-trailer Hauls 12-ton Rock Loads in New York

Loading rock in steel buckets at the Thirty-eighth street shaft. Each one holds 6 tons of broken stone and weighs a ton or more itself. These buckets are lowered into the shaft and filled with the loose rock, broken by the blasts in the cut below, and then hauled out by the same hoist and lowered onto the platform of the trailer. Two buckets are carried per load

The tractor then hauls the trailer to a pier on the Hudson river waterfront by the most direct route. It is able to make twelve trips, carrying 12 tons per trip in 10 hours. A horse wagon carries one 3-ton bucket and only makes 8 trips per day. The truck hauls 144 tons daily, the horse wagon but 24, or exactly one-sixth as much

On the dock the loaded buckets are swung off the trailer and over the side of the pier to a waiting scow moored alongside. Powerful cranes are used which are attached to the buckets by four chains, hooks in them engaging with clevises on the sides of the bucket

When they are swung over the side of the scow, the buckets are released and the crane proceeds to place two empty buckets, which have been piled on the bulkhead in waiting, onto the trailer, which then departs. When the tractor has left, the rock is unloaded and the empty buckets are piled on the bulkhead against the arrival of the next tractor. There is no waiting at either end on the part of the tractor-trailer units

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# Subway Silt Swiftly

## Heavy Dumping Trucks Carry 7½-ton Soil Cargoes Witnout Delay

The dirt from the excavation is elevated into overhead hoppers by means of chain-bucket elevators, where it is stored awaiting loading time. In the above picture a 7½-ton Mack is being loaded from the chutes leading from these hoppers in Herald Square. It only takes a few seconds to slide 7½ tons into the truck and the load is always there waiting for the truck

Above is shown another type of hopper, as used at the same Thirty-eighth street shaft as depicted on the opposite page, this hopper having the chutes inside, so as not to obstruct the narrow street. The top picture was taken on Sixth avenue, which at this point is wide enough to permit of more space being taken by the hoppers and loading space

At the pier on North river, as the Hudson is colloquially termed, the trucks back up to the guarded edge of the pier, directly above the waiting scows. Each truck is fitted with a power dumping gear, capable of elevating the body at an acute angle in 30 seconds

Several trucks may dump their loads at one time at the Thirty-eighth street pier. Each truck is timed as to its arrival and departure, both at the loading and unloading points, and accurate track is kept of the number of loads carried per day. As in the case of the Mack tractor and shown on the opposite page, there is no waiting for loads or a chance to unload. The truck, make from twelve to fourteen trips daily.

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Two fleets of motor buses recently installed by street railway companies. The one above is the first ten 1-ton Garford buses on an order of twenty-five for the Baltimore Transit Co., a subsidiary of the traction company in that city. The lower one is the four buses delivered to the Rapid Transit Co. of Honolulu H. I., built on Packard worm-driven chassis

# Bowing to the Inevitable, Street Railways Install Motor Bus Service

## Baltimore and Honolulu Traction Firms Acquiesce to Public Clamor—Transcontinentalist Builds Road-Yacht

### Baltimore Traction Line Installs Buses

LINES of least resistance have been followed by the United Railways and Electric Co., Baltimore, Md., in fighting bus competition. It has recognized the motor bus as inevitable because of its popularity with the public and superior convenience and comfort and so, in order to keep its hold on the transportation business of the Maryland metropolis while giving the public the sort of transportation it desires, it has established the Baltimore Transit Co. to operate a bus line.

Twenty-five chassis of the 1-ton size have been ordered from the Garford Motor Truck Co., Lima, O., the first ten of which have been delivered, the bodies being built by the J. G. Brill Co., Philadelphia. These ten have been installed on the same Charles street route that the Paye buses, reported in THE COMMERCIAL VEHICLE of August 15, operate over.

On Charles street from German street, down town, to University Parkway, where Charles street turns off into the suburbs, this route traverses the principal shopping district, passes the motor row and the Union depot, crosses North avenue, the northern thoroughfare, and continues on through the north side residence district and past Johns Hopkins University.

The buses take 20 minutes for the trip and operate on a 2-minute headway, which with the additional four buses of the Paye company gives Charles street the best transportation in the city.

The line started on Sunday, July 25, with five buses and now is running full force with the first ten of the fleet. The other fifteen, when delivered, will be put on other routes.

The bodies are a distinct improvement over anything previously turned out with as small capacity as twelve seats, seats being transverse and arranged in the conventional near-side, pay-as-you-enter style.

The bodies are painted a vivid blue with yellow trim and gear, and follow modern street car lines in exterior appearance and equipment. The door is to the right in front, the driver-conductor occupying a seat to the left. On the left side are two double cross-seats and to the right three single seats. At the right just behind the driver's seat is a two-passenger longitudinal seat and at the rear a full-width transverse seat.

Counting the rear seat as of three-passenger capacity this gives a total seating room of twelve passengers, but four may be seated in comfort on this rear seat, so that in case of necessity thirteen may be seated. Standing room is provided for also, sanitary hand straps being provided as on the ordinary street car.

The seats are rattan covered, the rear seat being divided into three sections, the middle one of which folds at the rear. The interior is in white enamel, which makes the buses look larger and makes them lighter within. A coin register box is fitted next the driver and in front of him, so that he need not turn to keep his eye on it. A two-leaf door closing one

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The Baltimore Garfords are all alike. The above view gives a glimpse through the street car type of door at the driver-conductor's seat with its fare register and the cleverly-arranged interior of the twelve-passenger Brill body

interior step and folding flush with the folding bottom step is operated by a vertical crank at the driver's hand.

All windows are of the drop-sash type and an extending visor over the driver's half of the divided windshield shades the driver's eyes.

The bodies are mounted directly on the chassis frame, a cut-under over the wheels making this possible. Electric lighting both inside and out is provided and exhaust radiators provide heat in cold weather. The buses are mounted on pneumatic tires for comfort and speed.

A sign within the body reads "No Smoking—Safety First."

## In the Land of the Pineapple

DOWN the palm-bordered avenues of that land of languid romance and pineapples a fleet of four of the latest type of motor buses will vie with the lumbering ox-cart and groaning street car as soon as a Pacific liner can unload them in Pearl Harbor, Island of Oahu, Hawaiian Islands, on which is situated the city of Honolulu.

These buses have been purchased of the Packard Motor Car Co., Detroit, Mich., by the Rapid Transit Co. of Honolulu. The Rapid Transit Co. operates a modern street car line and is following the lead of several of the most progressive street railway lines in the States in installing bus auxiliaries.

There are a number of growing residence communities about Honolulu which need development, but which do not as yet warrant the great outlay necessary to install a traction service. The buses, in short, are to be used as feeders to the city car lines.

The bodies are of the open type, for in that climate a closed body is unnecessary in any season. The sides are open above a low gunwhale, roller curtains serving to make the cars rain-tight in case of even the most severe tropical storm.

Besides a seat at the side of the driver, there is seating room within each body for twenty-three passengers and standing room besides. All but one of the eleven seats are transverse, the eleventh, at the front on the left side, being longitudinal. They are of the near-side, pay-enter type, but differ from other buses of this class in that the driver's seat is outside of the body proper.

A novel door arrangement is incorporated in these bodies, which were built by the Hopkins Mfg. Co., Hanover, Pa., the single entrance and exit door being on the right side but on the front wall of the body instead of on the side wall, the running board of the chassis forming the first step. The floor is brought down to the level of the frame, deep cut-unders giving clearance for the rear wheels.

The chassis is a standard 2-ton Packard worm-driven truck, with a special equipment of an electric lighting and starting system. Headlights are of the Golden Glow type and the interior is lighted by three large dome lights. The bodies are painted the same colors as the street cars operated by the company, deep yellow with red trim and aluminum lettering.

## Luxurious Road-yacht on Bus Chassis

MAXIMUM comfort and luxury in travel requires that the vehicle used be both independent and large. No one thinks of undertaking a long cruise in a small day launch, while shunning the public excursion boat. The exclusive, independent and commodious motor yacht is the development upon the water of the desire for maximum comfort together with independence and privacy.

On the land we have private railroad cars, but these are seriously handicapped by being bound to certain routes, and obliged to accommodate themselves to railroad schedules. The passenger motor car enables its owner to go where and when he pleases, but makes him dependent upon hotels and eating houses along the way if he would dine and repose in maximum comfort.

Roland R. Conklin, president of the New York Motor Bus Co., New York City, has tried, therefore, to transfer the motor yacht idea to the land. He selected a motor bus chassis, to all intents a 4-ton truck, as providing the maximum space and capacity for a body of yacht-like proportions and accommodations. On this chassis he built a body contain-

Interior of the hot-weather bodies on the Honolulu Packards. These are Hopkins bodies and seat twenty-three. Insert shows the novel front-end door in use

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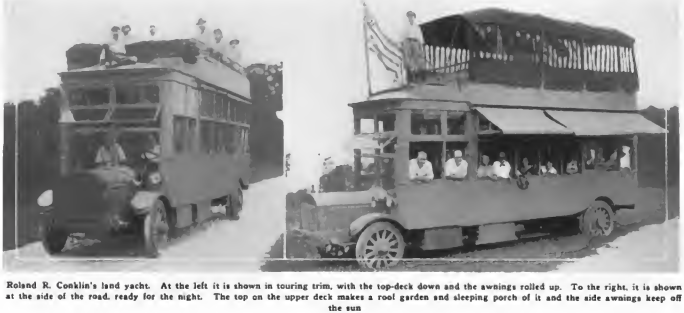

Roland R. Conklin's land yacht. At the left it is shown in touring trim, with the top-deck down and the awnings rolled up. To the right, it is shown at the side of the road, ready for the night. The top on the upper deck makes a roof garden and sleeping porch of it and the side awnings keep off the sun

ing all the comforts of a Harlem flat with an exterior something like a motor bus.

The start was made some time about the middle of August with a party consisting of Mr. Conklin and his family and two servants, a driver and a chef. The land yacht has a weight of 16,000 pounds, a wheelbase of 206 inches and an unusually low clearance.

Mr. Conklin has introduced a method of luxurious travel to the American elect which may well yet be adopted by others. It is not the first venture of the sort to be undertaken, but it is by far the most ambitious.

Novelty is to be found in practically every feature of the vehicle's construction; its name, Gypsy Van, being borrowed from the lexicography of rural England, where horse-drawn house-wagons are often encountered.

The chassis is characterized by an exceedingly stout frame of pressed steel, mounted on springs 56 inches in length and carrying a six-cylinder 4½ by 5 motor coupled to the worm-driven rear axle by two three-speed gearsets, affording nine speeds forward and three reverse. This gives easy steps from a low gear ratio of 86 2/3 to 1 up to a direct drive at 8 2/3 to 1. The Fifth avenue buses in New York, which are slightly heavier than Mr. Conklin's land yacht, have a maximum reduction of 26 to 1.

Tires are solid, 36 by 5 all around, the rear ones dual. For use in exceptional difficulties a winch is fitted.

For electric lighting, cooking, electric fans, and vacuum cleaning a 7½-kilowatt generator is employed in connection with a thirty-cell storage battery of 225 ampere-hour capacity at 36 volts, an entirely separate electric system being used for the headlights, for starting and for ignition.

An auxiliary water pump, driven off the engine, serves to fill the large water tank on the roof.

The body is laid out in two decks, the lower one divided into three compartments and the upper one entirely free, to be used as an observation platform and roof garden. It is 21 feet long, 7½ feet wide and 6½ feet of headroom is afforded on the lower deck. The overall height of the car is 11 feet 6 inches. A great extension top may be raised to protect the upper deck from sun or rain, Jiffy curtains being provided. There are forty-four windows, all practicable, and screens and screen doors are fitted.

The driver's cab is entirely separate from the rest of the vehicle and accommodates the chef also when he is not on duty. Two berths may be made up over the seats in this compartment for the servants.

Abaft the cab is the main saloon, to use the nautical phraseology which seems to fit this land-yacht best. At the forward end is a divan or couch which extends across from side to side and back of this are two other divans along the side walls, the one to the right being divided so as to form two arm chairs.

In the ceiling are berths which are entirely invisible when folded but which form upper berths over the three divans as lower ones, when let down. Each of these berths is larger than the Pullman variety, and all manner of drawers, wardrobes, etc., are concealed beneath the divans, in the walls, etc.

Back of the main saloon is the galley, or kitchen, in which are a range, a sink, a wash basin, a dresser, a refrigerator, a shower bath, a hookcase and a writing desk. A folding companion, which does duty as a card table when desired, gives access to the upper deck, and a door at the rear affords ingress and egress.

The upper deck contains all manner of lockers which, with adjustable back-rests, act as seats and, for all the world like a yacht's lifeboat, for scouting purposes, for errands, and for expeditions for provisions and help when stuck, a motorcycle is secured to the rear end.

The main saloon of the Conklin Gypsy Van with a glimpse of the galley, aft. The arm-chairs and the divan may be made into berths, upper berths being made from ceiling panels which drop. Note the large drawers beneath the divan and arm chairs

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# Reel Truck Reels off Miles

In the Rockies with the Lincoln Highway film expedition—1 mile from the highest point on the road, near Sherman Hill

A close-up view of the truck, affording legibility to the signs. Note the water can and the Lincoln Highway L

CHICAGO TO SAN FRANCISCO is the work cut out for a motor truck accompanying the moving picture expedition of the Lincoln Highway Assn., which started from New York and will soon reach Exposition City.

**When the transcontinental Lincoln Highway feature film party had gone as far as Chicago Heights, Ill., just out of Chicago, the baggage which it had accumulated was overflowing the touring cars which had served it thus far, and so a truck was decided upon as the baggage car of the train.**

A truck manufactured on the Lincoln Highway was selected, W. O. Duntley, president of the Chicago Pneumatic Tool Co., providing a 1½-ton Little Giant for the purpose.

It is equipped with Firestone tires, a Stewart speedometer, two Stewart horns, a prestolite tank and lighting equipment and a Pyrene fire extinguisher, donated by their respective manufacturers.

It has to carry from 3,500 to 4,000 pounds of baggage all of the time, and unfortunately it cannot stick to the main road, but must make side trips to most of the important points along, as well as on, the Lincoln Highway, to arouse interest.

**The body resembles a prairie schooner, in a somewhat modified form, having a white canvas top and side-curtains and a canvas awning over the cab. It is prominently lettered with its mission, with the Lincoln Highway L on its red, white and blue background displayed on each side of the seat, on the radiator, tailboard and on each of the large water cans strapped to each running-board.**

A large searchlight serves to illumine the road at night and two Stewart hand horns are applied to opposite ends of the seat.

En route—above, a stretch of sage brush and alkali; upper right, climbing a 30 per cent grade and stopping in the middle of it for a picture; right, Medicine Bow, Wyo., cars shown in front of the famous Virginian hotel where Owen Wister wrote his novel, "The Virginian"

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# Dry Goods Trucks Made More Efficient by Separate Delivery Building

## New Pittsburgh Store Has Delivery Department in Garage ¼ Mile Away—Trucks Loaded Quickly in Garage—Sidewalk Congestion Eliminated

UTILIZATION of practically the entire basement floor of the new Rosenbaum department store in Pittsburgh, Pa., for sales instead of shipping purposes has been secured by the use of an upper floor of the Rosenbaum garage as a delivery department. The garage is located about ¼ mile from the main store, where the land values are considerably less, so that the cost of the space required for the necessary but non-earning shipping and wrapping department is less than what it would be if at the main store. Besides, the sales or earning area of the basement floor is conserved, only a small portion of one corner being required for the necessary handling of the packages to get them to the street for transfer to the garage by means of motor trucks. Only a comparatively small area is necessary for this work because the packages are sorted as to class but not as to destination.

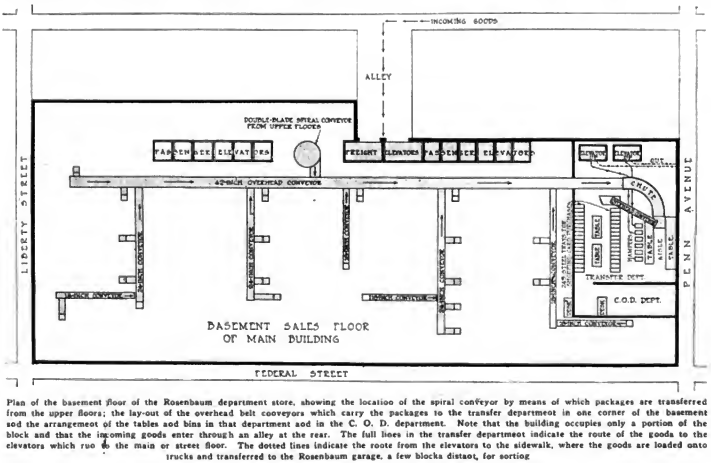
This method of locating the shipping department of a large department store in another building, separate and at some distance from the main store, while not entirely new, offers another important advantage in this particular case, the elimination of sidewalk loading congestion.

### Sidewalk Loading Costly and Slow

In the old structure which the Rosenbaum company occupied before it moved into its present thirteen-story-and-basement building, this sidewalk loading congestion was a great detriment to the efficiency of the store's delivery system. Then, as reported in the September 1, 1914, issue of THE COMMERCIAL VEHICLE, the packages had to be taken from the wooden bins in the basement and loaded into handtrucks by the drivers and helpers and then pushed the length of the floor to a sidewalk lift, up in the latter to the level of an alley, the width of the floor, down the alley, into the street, the length of the store to the next street and then into the latter street to the motor truck. This system was perhaps the most inconvenient of any of the Pittsburgh department stores because of the sidewalk loading and the damage to goods in rainy or snowy weather, the congestion of the handtrucks, which annoys pedestrians, hinders the work of the loaders and renders the danger from theft imminent.

### Street Tunnel Planned

When the plans for the present store were being drawn up, it was decided to do away with this slow, costly and inconvenient method of loading by the erection of a warehouse across the street, the packages to be transferred from the store to the delivery department in the warehouse by means of a tunnel beneath the street. Unfortunately, this scheme could not be carried out because the Rosenbaum company could not secure a




Plan of the basement floor of the Rosenbaum department store, showing the location of the spiral conveyor by means of which packages are transferred from the upper floors; the lay-out of the overhead belt conveyors which carry the packages to the transfer department in one corner of the basement and the arrangement of the tables and bins in that department and in the C. O. D. department. Note that the building occupies only a portion of the block and that the incoming goods enter through an alley at the rear. The full lines in the transfer department indicate the route of the goods to the elevators which run to the main or street floor. The dotted lines indicate the route from the elevators to the sidewalk, where the goods are loaded onto trucks and transferred to the Rosenbaum garage, a few blocks distant, for sorting

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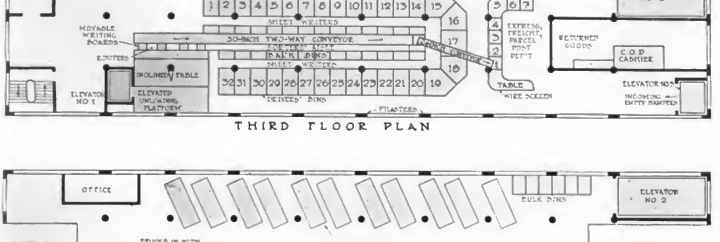

**Plans of the first and third floors of the Rosenbaum garage, showing the positions of the motor trucks on the first floor and the arrangement of the delivery department on the third floor. The hampers with the unsorted goods from the store are deposited on the elevator shown in the lower left corner of the first-floor plan. They are rolled off the elevator at the third floor and then tipped over, the goods sliding down the inclined table to the routers, who place the packages on the belt conveyor in the center of the floor. Sorters stationed along the conveyor on both sides pick off the packages and place them in the back bins according to the various delivery routes. Sheet writers take the packages from the back bins and place them on shelves in the drivers' bins. The drivers push them into hampers, which they take down to the first floor on elevator No. 2. The trucks are loaded in their positions on the floor and leave the garage on the ramp to the right. Elevator No. 3 is used to take the empty hampers back to the third floor**

permanent permit for the use of an underground tunnel were it built.

Rather than build the warehouse across the street from the main store and the tunnel to connect them, only to have to vacate the necessary tunnel link in case a sewer were put through the street, the Rosenbaum company abandoned the plan.

### Shipping Department in Garage

In its place, the company decided to use the entire third floor of its motor truck garage as a shipping department in which the packages were to be segregated and routed according to designation and then loaded onto the motor trucks in the same building for the ultimate delivery to the customer. This method eliminated the use of a large area of the basement of the main store for sorting and routing the packages and also the sidewalk congestion incident to loading the motor trucks in the street instead of in the garage.

Of course, it would have been more convenient to have had the shipping department in a building opposite the main store, because this would have eliminated the use of a motor vehicle to transfer the goods from the store to the present building ½ mile away, but it is possible that the higher rental charges of a building adjacent to the main store would have more than offset the cost of the present arrangement.

The general lay-out of the basement floor of the main store is given in the sketch at the bottom of page 24. The packages sold on the thirteen upper floors of the store are transferred to the basement floor by means of a large spiral chute. This chute empties onto one main belt conveyor suspended from the ceiling of the basement. This conveyor carries the goods to a small room at one corner of the floor, where they are sorted as to class but not as to route. After this has been done, the goods are placed in conventional department roller boxes, or hampers, which are pushed to one of two elevators that carry them to the street level.

They are then pushed out onto the sidewalk, where the goods are loaded indiscriminately into the transfer truck which runs between the store and the garage.

### Details of the Store System

The details of this system are shown clearly in the sketch at the top of page 26. The large spiral chute is located at the center of one side of the building between two groups of passenger and incoming freight elevators. At the bottom of the spiral chute there is a small conveyor which deposits the goods directly onto a 42-inch belt conveyor which extends for practically the entire length of the building and leads to the semi-sorting room at one end of the floor. Along the main belt conveyor, and at right angles to it, are five feeder conveyors, also suspended from the basement ceiling.

These feeder conveyors are smaller than the main one because of the lesser amount of goods handled, their purpose being merely to carry the goods from the opposite side of the store to the main conveyor which carries all the packages to the room in which they are sorted as to class. Each of the feeder conveyors have several chutes leading to the main floor in which goods are deposited direct from the various counters. These chutes act as auxiliaries to the main spiral conveyor.

All of the conveyors are of Lamson make, driven by individual motors with automatic control. The normal speed of the conveyors is 125 feet per minute, so that it takes approximately 2½ minutes for a package to cover the maximum distance of about 300 feet between the most distant feeder conveyor to the semi-sorting room. The time taken for the passage of a package down the spiral chute to the main belt conveyor depends upon which floor it was deposited. The maximum time, of course, is from the thirteenth, or top floor, and this varies from 2 to 3 minutes, so that the total time for a package to get from the top floor to the semi-sorting room in the basement varies from 4½ to 5½ minutes.

### Goods Divided Into Four Classes

Paid, C. O. D. and transfer packages and goods purchased on shopping cards

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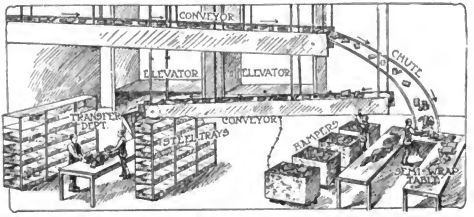



Perspective view of the semi-sorting room in the main store, showing the overhead conveyors; semi-wrap table; hampers and steel bins for shopping-card goods. The arrows indicate the route of the hampers to the elevators which carry them to the main floor

are wrapped at the point of purchase and placed in the spiral conveyor or feeder chutes indiscriminately. Each class of goods has a distinctive sticker on the wrapping so that it may be easily identified.

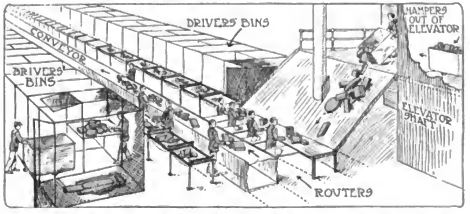
After reaching the main belt conveyor the goods are carried to one end, where they slide down a curved gravity chute onto a U-shaped table with an aisle between the arms of the U. Sorters stationed in this aisle segregate the packages according to class.

Paid packages are deposited into hampers lined up along one side of the table after being entered on sheets to check the number leaving the store with the number received at the garage routing department. This is necessary in order to keep track of the packages between the store and the garage and to trace any packages lost while in transit between these two points.

### How Shopping-card Purchases Are Handled

The transfer and shopping-card purchases are sorted at the U-shaped table and then thrown up on a short belt conveyor which deposits them on a separate transfer table at one end of the aisle in which the hampers for the paid packages are lined up. From this table the transfers are recorded on sheets before being deposited in other hampers used especially for this class of goods. The shopping-card purchases, each of which has a sticker on the wrapper with the number of the shopping-card, are then segregated according to each number and placed in two rows of metal bins. One of these rows extends from the transfer table to form one side of the aisle in which the paid-package hampers are kept. The other row is parallel to it, with two small tables between, upon which the packages are placed before being put into the bins.

As the first package with any particular number is received at the transfer desk, it is placed in one of the bins by itself. As other packages with the same number are received they are placed in the same bin until the purchaser presents himself at a window at one end of the row of bins nearest the center of the store to pay for all of his purchases in one lump sum. Then a clerk removes from the bin all the packages with stickers of the same number, adds up the cost of each, receives the purchaser's cash, enters the number of packages on delivery sheets and then wraps them in one bundle which is finally deposited into a hamper and sent to the sorting department in the garage.




Perspective view of the lay-out of the delivery department in the garage, showing relative positions of conveyor, back bins and drivers' bins. Note the inclined table on which the packages are dumped from the hampers

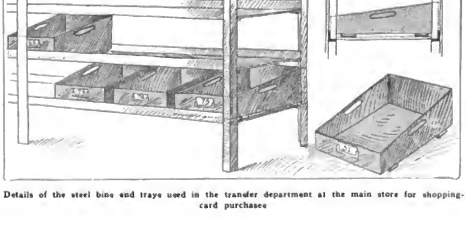
The metal bins are made up of angle-iron stands with five horizontal shelves on which individual steel trays are placed. These are in the shape of a truncated prism, with the back higher than the front. Each tray is numbered so that the shopping-card goods deposited in it may be easily identified.

As shown in the detail sketch of the stand and tray given at the bottom of this page, the trays are mounted on small rollers and may be pushed along any one shelf from one end to the other for convenience.

The C. O. D. packages are pushed to the rear of the U-shaped table as they come off the main conveyor chute, where they are duly recorded on sheets for this purpose and placed in hampers. When filled these hampers are pushed to one of the two elevators, which carry them to the street level. The paid, transfer and shopping-card packages are carried in other hampers to the street level in a similar manner. A perspective view of the main conveyor chute, the U-shaped table, the transfer bins and tables is given in the sketch at the top of this page.

### Loaded Hampers Put Into Trucks

After the hampers filled with goods reach the street level they are rolled out on the sidewalk and then loaded, hamper and goods, into a motor truck for transference to the routing department at the garage.



Details of the steel bins and trays used in the transfer department at the main store for shopping-card purchases

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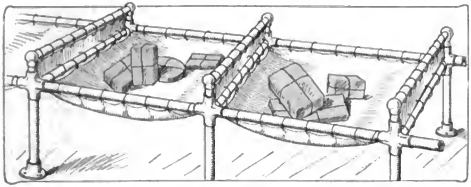


Close-up view of the back bins in the garage delivery department, showing pipe framework with canvas bottoms

Arriving at the garage, the truck runs in on a ramp to the main floor, on which the other motor trucks of the company are garaged, and backs up to an elevator near the ramp. The hampers are unloaded from the truck onto the elevator and then carried to the third floor. They are then rolled off the elevator on an elevated platform about 6½ feet above the level of the floor. One side of this platform abuts the side wall and at the other there is an inclined table or chute. The hampers are pushed to the chute side of the platform and tipped up at the rear end, thus dumping their contents onto the chute. The packages slide down this by gravity to a routers' table at the bottom.

### How Packages Are Routed

Routers stationed at the bottom of the chute mark each package with the number of the route on which it is to be delivered and then place it on a two-way belt conveyor which runs lengthwise of the floor for the greatest part of its length. Along one side of this conveyor is an aisle in which sorters stand and pick off the packages as they pass and place them in two rows of back bins, parallel with the conveyor, one directly behind the sorters' aisle and the other next to the conveyor itself with no intermediate aisle between. Directly behind each row of back bins there is another aisle in which sheet writers are stationed. These men pick the packages from the back bins and place them into the drivers' route bins which are arranged in two rows parallel with the conveyor, but joined at the far end of the latter in the shape of a U.

From these bins the drivers take the goods to be delivered on their routes to the first floor in hampers of the same design as those used in the main store and then load the packages onto the trucks in their positions on the floor.

The arrangement of the first and third floors, respectively, are shown in the sketch at the top of page 25. The shaded rectangles show the positions of the trucks as they are stored over night on the first floor. The elevator designated as No. 1 is the one on which the loaded hampers from the store are carried to the third floor.

The plan view of the latter floor shown in the same sketch gives the lay-out of the conveyor, the sorters' and sheet writers' aisles, the back bins and the drivers' bins. It also shows a group of seven additional bins which are used for express, parcel post and freight goods and the small conveyor to transfer these classes of goods from the main conveyor. Elevator No. 2 is used by the drivers to take their loaded hampers to the first floor, and elevator No. 3 to bring the empty ones back to the bins. Separate elevators for these uses avoid confusion and delay. Returned goods are handled and C. O. D. payments made in a screened enclosure between elevators No. 2 and 3.

### Routers Put Numbers on Packages

The routers stationed at the base of the inclined table who mark the route numbers on the packages in crayon greatly facilitate the work of the sorters, who need only glance at the number to determine in which back bin the parcel belongs. Due to this arrangement, sorters are stationed on only one side of the conveyor and are thus able to toss the packages into the back bins on both sides of the conveyor without making it necessary to have a sorters' table on each side.

Each sorter is assigned a certain number of bins on both sides of the belt. He picks up the packages with their numbers only, allowing the rest to move along to the next sorter. Packages which have gone too far and should have been picked up by sorters closer to the head of the table are thrown back by those lower down on the belt, or permitted to run the full length of the conveyor. Here they are automatically deposited on the lower half of the belt and returned to the head of the table, onto the floor. From time to time sorters at that end of the belt pick them up and place them on the belt again.

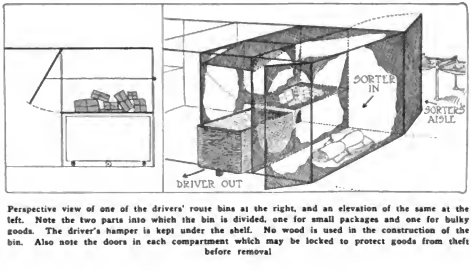
### Advantages of Expert Routers

The employment of routers at the bottom of the inclined table instead of dumping the packages directly onto the belt to be routed by the sorters, permits of the use of a smaller number of lower-salaried sorters. It also limits the responsibility for incorrect routing to the small number of routers instead of the large number of sorters.

The two rows of back bins are made of pipe, their bottoms of canvas, secured by thongs. The use of pipe gives them great rigidity and strength and permits the floor beneath to the swept thoroughly. The use of canvas instead of wood acts as a cushion to protect the packages when they are thrown into the bins. A perspective sketch of these bins, showing their method of construction, is given at the top of this page.

Directly behind both rows of back bins there are aisles for the sheet writers, who pick the packages from the former and place them into the drivers' bins, meanwhile entering each package on the drivers' delivery sheets. The packages are checked with these sheets before the drivers are allowed to take them down to the first floor to load them onto the trucks. There is a back bin for each driver's bin to eliminate the chance of putting the packages in the wrong bin.

The drivers' bins are of wire mesh over iron frames and are of the same




Perspective view of one of the drivers' route bins at the right, and an elevation of the same at the left. Note the two parts into which the bin is divided, one for small packages and one for bulky goods. The driver's hamper is kept under the shelf. No wood is used in the construction of the bin. Also note the doors in each compartment which may be locked to protect goods from theft before removal

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The bull is tied inside—the trailer

design as those used by the Kauffmann & Bear department store in Pittsburgh and described in the September 1, 1914, issue of THE COMMERCIAL VEHICLE. The exterior dimensions of each cage are: 7 feet, length; 6 feet, width, and 7 feet, height. Each bin is divided into two parts, one for small packages and the other for bulky goods, such as rugs, ironing boards, clothes wringers, etc., which are not delivered on the furniture trucks of the company. The part for the small packages is a bin with a shelf about 3½ feet from the floor. The other part is an L-shaped cage surrounding the first part on two sides and making a rectangular-shaped plan of both parts. The driver's roller hamper is kept beneath the shelf in the bin.

**Drivers' Bins Can Be Locked**

That portion of the bin directly above the shelf on the end towards the sorters' aisle is open to permit him to place the packages on the shelf with the least inconvenience, but the other end is equipped with a door which may be locked. This door is pivoted at the top and is held open on a pair of crescent brackets. It is opened and closed by one of the sorters by means of a rod similar to that used in opening and closing the conventional type of door transom.

That portion of the cage for the bulky articles has two doors which may be locked, one at the end facing the sorters' aisle and one at the drivers' end.

By locking the door above the shelf and that at the same end of the other part of the cage, the driver cannot take any goods out of either portion until the sorter is ready to check it up with the former's delivery slip. As none of the drivers are allowed in the sorters' aisles behind the drivers' bins, this type of cage effectively prevents theft of goods before they are checked up with the regular delivery slips.

A perspective view of the cage is shown at the bottom of page 27, and at the bottom of the preceding page is shown another perspective sketch of the conveyor, back bins and drivers' bins, giving their relative position to each other and showing the manner in which the packages are handled from the time they are dumped from the hamper onto the inclined table.

The really distinctive feature of this delivery system is not in any of the mechanical details, but in the fact that the entire routing is done in a building entirely separate from the main store. The advantages of this system are the conservatism of the costly sales space in the main store; the elimination of the slow outdoor sidewalk loading, and the substitution of quick indoor loading without congestion and without damage to the goods in inclement weather, with the result that the motor trucks are loaded more quickly and can therefore do more work in the same time at a lesser unit cost—the goal for which all motor truck operators are striving.

## Efficiency With a Vengeance

A clear case of New England thrift is found in Littleton, Mass., where William H. Davis, the local undertaker, who also holds the contract for transporting the school children from an outlying district to the central school, utilizes a Ford undertaker's wagon, with black covered wooden body, as a school barge. A double use is thus found for the one vehicle.

When in service as a barge, the wagon is furnished with two temporary seats, each of which holds a half-dozen children. When put to more solemn use, the seats are taken out for the time being.

## Concrete, a Road Possibility

REQUIREMENTS for country roads differ greatly from those for city pavements, for whereas both types of roads must be smooth, dustless and offer little resistance to vehicles to conform with present-day requirements, country roads must be cheaper than city pavements, and may be so because of the lesser volume of traffic which they must accommodate.

Paving materials of all kinds offer some advantages and some drawbacks. Some which are cheap fail to give satisfaction; others which are ideal in every way are prohibitively expensive. Concrete is in its infancy as a road material, but any who have traveled over the excellent stretches to be found in Wayne county, Mich., or throughout the main roads of Maryland can testify to its smooth surface, its low resistance notwithstanding its good tractive surface, and its freedom from ruts or waves which are the bane of bituminous surfaces.

Concrete is expensive to lay, although not by any means the most costly type of surface; it is difficult to repair when necessary, the trouble with expansion joints has not as yet been eliminated, and they are noisy under horses' hoofs; but, on the other hand, they are durable, not subject to deterioration such as makes frequent repairs necessary, so that maintenance is very economical, and they are mudless and dustless.

Very complete data on concrete road history, construction, etc., is contained in Bulletin 249 of the Office of Public Roads, U. S. Department of Agriculture, a 34-page brochure, illustrated by eleven half-tones and a number of charts and diagrams of a practical nature.

## Pioneer Engineer Has Versatile Ford

JAMES H. JONES, the first chief engineer of the Knox Automobile Co., who was afterwards with the White Co. when it changed from steam to gasoline, and still later designed airplane motors for the Hendee Co., two years ago he gave up work entirely and went back to the land at South Hadley, Mass. He has made a big success of it. His only connection with the motor industry is to do a little consulting work occasionally and exercise his trusty Ford to keep it from getting too fat in the rich pastures of South Hadley.

His latest stunt with the Ford was to make it act as a tractor to draw an express wagon of 1,500 pounds capacity. Of this stunt he says: "With just a little box back of the driver's seat the Ford would hardly do all our light hauling to and from town, so I tried towing an express wagon by roping the shafts to the frame of the car, but I found there was not weight enough on the driving wheels for traction on the hills and soft places; besides, it was impossible to back the wagon. Finally I bought a Martin rocking fifth wheel connection and mounted the wagon semi-trailer fashion, and now have plenty of weight for traction and can back it into any place. It is so easy to connect and disconnect that we use the Ford for a work horse on week days and a passenger car on Sunday."

Mr. Jones recently bought a herd of extra fine Guernsey cattle at a place 50 miles from his farm, and he hauled them home, one animal at a time, with the Ford

The picture shows the king of the herd, His Majesty Mixer Demonstrator, one of the very fancy gentlemen cows of this country, who kindly consented to pose in his limousine.

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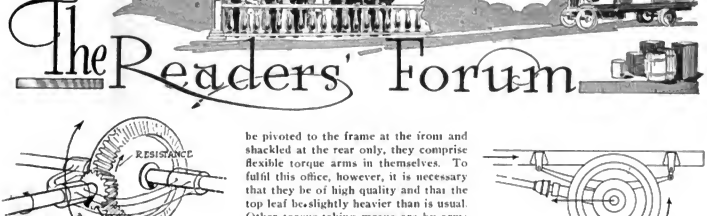

Fig. 1—Axle torque and how produced

## AXLE TORQUE AND PROPULSION

### Axle Resists Drive in Two Directions—Methods of Restraint

To the Editor, COMMERCIAL VEHICLE: In the descriptions of motor trucks published in THE COMMERCIAL VEHICLE from time to time, I have noticed the terms Torque and Propulsion used frequently. As I am new to motor truck mechanics, these terms are a little beyond me, although in a general way I understand what these words mean. What I want to know is just what they mean in reference to motor car construction.

2—Several methods of taking this torque and propulsion are given, such as by the springs, by torsion arms and tubes and by radius rods. Please define these and explain how they fulfil these offices.

3—Why so much diversity in the manner of taking torque and propulsion, whatever they are, when other features of construction are practically standard? —Milton Harris, Baltimore, Md.

1—Torque is the tendency of the axle housing of a shaft-driven truck to twist bodily about the axle shafts instead of remaining stationary while the shafts revolve, as illustrated in Fig. 1. In this illustration the bevel type of gearing is shown, but the same principle applies to any other form. Without some form of restraint, application of power to the driving shaft would merely twist the axle around, as shown by the arrows until it broke itself loose from the shaft or injured it by distortion.

Propulsion, as shown in Fig. 2, consists of the tendency of the axle to move forward, as the wheels roll and tear itself loose from the frame. In other words, the axle being separate from the frame, it must propel it by some pushing connection with the frame, just as a man pushing a wheelbarrow must have handles to push by, or his walking will not move the barrow.

2—The simplest means of taking torque is by the vehicle springs. As these are anchored to the axle and may be pivoted to the frame at the front and shackled at the rear only, they comprise flexible torque arms in themselves. To fulfil this office, however, it is necessary that they be of high quality and that the top leaf be slightly heavier than is usual. Other torque-taking means are by arms secured on a vertical axis to the axle housing and at a single point to a cross-member of the frame about coincident with the front driveshaft universal, by a torsion tube surrounding the driveshaft and secured to the frame cross-member by an incircling yoke or hollow ball-and-socket joint, or by radius rods attached rigidly to the axle at its two sides and converging to one point beneath or above the driveshaft universal.

Propulsion likewise may be taken by the springs, which requires that they be still higher in grade and that their design be specially adapted to such duty. Torsion tubes are also used to take propulsion, in some cases, usually braced by converging radius rods to prevent too much strain in the middle of the axle. The common way in chain-driven vehicles, also used to a considerable extent on shaft-driven types, is by means of radius rods pivoted independently on opposite sides of the frame.

3—Diversity in methods exists in nearly all features of modern motor trucks, but it is true that in the methods of taking torsion and propulsion there seems to be little agreement. That springs are not universally used is due to the fact that only springs of the highest grade can be safely relied upon for such work. It is also claimed by some that springs which are shackled at their rear ends only are not as flexible as those shackled all around, but this is not demonstrated.

It is contended with reason, however, that in the event of a broken spring, without other means of propulsion, the vehicle cannot be operated, while a broken radius rod will not interfere with the spring taking the propulsion, in spite of its shackle.

The advantages claimed for spring propulsion and particularly torque are flexibility, simplicity, silence and light weight. Solid torque bars and radius rods transmit the full shocks imparted to the axle to the truck frame, while the springs absorb at least a portion of them. Greater turning effort can be transmitted

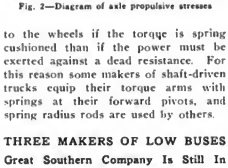

Fig. 2—Diagram of axle propulsive stresses

to the wheels if the torque is spring cushioned than if the power must be exerted against a dead resistance. For this reason some makers of shaft-driven trucks equip their torque arms with springs at their forward pivots, and spring radius rods are used by others.

## THREE MAKERS OF LOW BUSES

### Great Southern Company Is Still In Business at Birmingham

To the Editor, COMMERCIAL VEHICLE: In a recent issue you gave a description of a one-man, pay-enter bus designed by the Great Southern Automobile Co., Birmingham, Ala.

Can you tell me whether this company is doing business or not, and if not, do you know of any other company making or contemplating making buses of this type on a 1½-ton or 2-ton chassis? —Eugene F. Piaget, Great Notch, N. J.

The Great Southern Automobile Co. is still in business at Third avenue and Eighth street, Birmingham, Ala. THE COMMERCIAL VEHICLE knows of no other concern making of contemplating the manufacture of buses of this type, although the New York Motor Bus Co., New York City, and the Field Omnibus Co., New York City, have made buses with low floors on electric and gas-electric chassis.

## THERE IS NO KELLS TRUCK

If the reader mailing his letter from the Tremont station, New York City, will give the editor his name and address—not for publication—he will be advised why THE COMMERCIAL VEHICLE was not in error in stating that the Fifth Avenue bus illustrated on page 30 of the August 1 issue is on a De Dion-Bonton chassis.

No anonymous communications are answered in The Readers' Forum, but readers who do not desire their names published may sign *nom de plumes* if the editor is supplied with their names and addresses.

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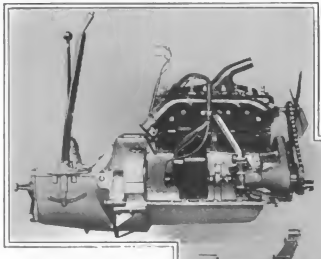


Above, right side of unit power plant of new G. M. C. models, showing magneto and pump on same shaft, valve-spring cover-plates and control levers

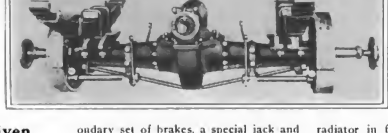
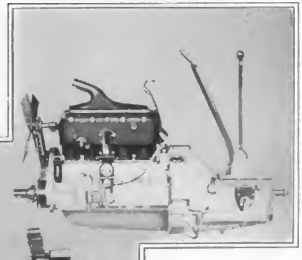


Fig. 1—Details of new G. M. C. 2-tonner — Below, Timken - Detroit worm-driven rear axle and spring assembly. Note elevated spring perches carrying radius rod hangers



Above, left side of G. M. C. unit power plant, showing inlet pipe, carbureter and governor. Note bracket at side of gearbox for pedal shaft mounting

## Three Worm-driven G.M.C.s

TWO MORE worm-driven models have been added by the General Motors Truck Co., Pontiac, Mich., the first of these models having been announced in THE COMMERCIAL VEHICLE of April 1, 1915. The new models are similar in design to the original of these, but differ in the size and strength of load-supporting parts and in minor details.

Several interesting refinements have been made on all three, some of which are new. Among these are a chained cap to the radiator, a steel dash, changeable brake linkages by which the pedal connection may be shifted to the secondary set of brakes, a special jack and holder, a tool case on the seat and a license bracket on the front fender.

The new models are of 1½ and 2 tons capacity, the first of the series being of 1¼ ton burden. Details of these chassis are as follows:

| | | | |
|---|---|---|---|
| Capacity, pounds... | 2,500 | 3,000 | 4,000 |
| Price ..... | $1,800 | $1,900 | $2,375 |
| Wheelbase, inches.. | 144* | 144* | 158** |
| Tires, front..... | 36x3½ | 36x3½ | 36x4 |
| rear ..... | 36x5 | 36x5 | 36x4d |
| Drive ..... | Worm† | Worm | Worm† |

*136-inch optional. **144-inch optional. †Chain optional.

The two smaller models have the same motor, the larger having a somewhat larger one. On all three the motor is under a European type hood with the radiator in front, the hood being provided with louvres. It is of the unit power plant type, the gearset being bolted to the flywheel bell-housing. Details are as follows:

| | | | |
|---|---|---|---|
| Capacity ..... | 2,500 | 3,000 | 4,000 |
| Bore ..... | 3¼ | 3¼ | 4⅛ |
| Stroke ..... | 5 | 5 | 5¼ |
| S. A. E. horsepower. | 22.5 | 22.5 | 27.2 |
| Speed, m. p. h..... | 16 | 16 | 14 |

Cylinders are cast in block, the valves located to the right with inclosed mechanisms. The carbureter is bolted to a single pipe on the left side, the manifold being cast integral with the cylinders and concealed within it.

Cooling is accomplished by centrifugal pump circulation through a vertical finned-tube, cast-case radiator and ignition furnished by the Eisemann single system, with hand spark advance.

The clutch is a dry-disk unit, driving a conventional three-speed selective gearset, with the brake and change-gear levers mounted on its cover, and, of course, in the center of the cab. From thence the drive is taken by a triple-universalled shaft to the Timken-David Brown worm-driven rear axle.

Springs are relied upon to take the torque, but radius rods are used for propulsion. These are plain flat bars, with spring pivots in front, the hangers serving for the front shackles of the rear springs as well. The frame is of pressed steel with only one rigid cross-member back of the gearset, the others being flexible round ones. The rear semi-ellipticals are perched above the axle.

Brakes are of the new Timken double-expanding type, both sets acting within the same drums and for their full width,

Fig. 2—Laura steel-bred trailer being towed by a Ford runabout with anti-rattling draw-bar

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as described several times recently in THE COMMERCIAL VEHICLE. A unique feature of the brake linkage is provision whereby when the foot brake wears down the linkage which connects it with the control pedal may be disconnected and that leading to the hand brake substituted, as the hand brake receives, in ordinary practice, much less wear than the foot brake.

The steering wheel is located to the left, with the levers in the center. Spark and throttle levers are mounted on top of the wheel. A sight-feed is located on the dash to afford the driver knowledge of the state of his lubrication at all times.

Equipment has been carefully thought out in the new G. M. C. vehicles. Small doors at the front of the seat fold down to disclose tool boxes under the seats. These are shallow, for the gasoline tank is located beneath the seat, but as deep as would be conveniently accessible. The door on the left side carries a tool set, folding against another within the box, and the box to the right is reserved for supplies.

At the left side of the cab is a metal standard which supports a special jack so that it is always secure and accessible. A lock is provided so that theft is impossible.

Fenders are of the crowned type, very wide and flat and well winged to the frame. That to the right carries a substantial bracket for the front number plate.

Fig. 4—Tool compartments on front of G. M. C. seat and special jack locked in bracket on left side of frame

The 1¾- and 2-ton models are made with chain drive at the same prices as the worm-driven types.

## Laura Light Trailer

FOR PACKAGE delivery and other light work, the Laura trailer, made by John F. Laura, Coldwater, Mich., is intended for use behind touring cars and runabouts, by which they may be converted for commercial use without changing them. The trailer runs on two wheels with steel tires and is balanced by a patented draw-bar which acts as a coupler, bumper and balance all three. It is quickly coupled and uncoupled without the use of tools, and when coupled a spring device prevents rattling.

The axle is of the 1,000-mile type, of Mather manufacture, that is, a magazine oiling arrangement retains one charge of oil sufficient for 1,000 miles. The wheels are similar to the usual buggy wheel and the body is mounted on a platform spring. The body is made in an open flareboard type as standard.

The capacity of the trailer is 1,000 pounds, its weight 350 pounds and the price at Coldwater, $37.50.

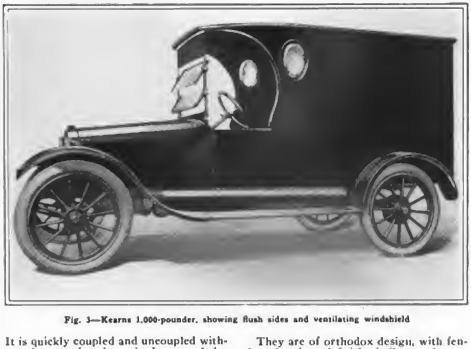

Fig. 3—Kearns 1,000-pounder, showing flush sides and ventilating windshield

## Kearns Light Delivery Cars

LIGHT-WEIGHT high-speed parcel delivery vehicles in two models have been announced by the Kearns Motor Truck Co., Beavertown, Pa., the capacities being 1,000 and 500 pounds. These two models are known as the Kearns Sr. and the Kearns Jr., respectively.

They are of orthodox design, with fenders, hoods and finish similar to that on passenger vehicles. Nickel-plated radiators, tapered hoods merging with the cowl dashes, side doors, rain-vision and ventilating windshields, electric starting and electric lights are refinements which are intended to give the elegance of appearance which is considered essential in residential delivery work.

Electric starting and lighting are used as much for economy in wear and tear and fuel consumption as for convenience. Ease of starting gives the driver an incentive to shut off his motor at each stop, thereby saving wear and tear, fuel and avoiding heating. Quick starting enables the vehicle to do more work in a day because of the elimination of the delays incident to hand starting at each stop.

These models supercede the former 1,500-pound friction-driven high-wheeled

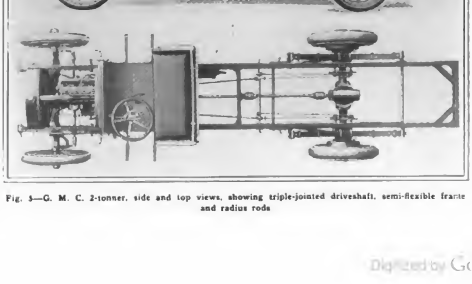

Fig. 5—G. M. C. 2-tonner, side and top views, showing triple-jointed driveshaft, semi-flexible frame and radius rods

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Fig. 6—1-ton Garford, showing composite tire equipment, characteristic Roman dash and folding back-rests on seats

product, with chain drive, and are radical departures from former construction.

Motors are under the bonnet and standard gearsets drive the live rear axles through bevel gears. They have pneumatic tires. Particulars of the chassis follow:

| | | |
|---|---|---|
| Capacity, lbs. | 500 | 1,000 |
| Price | $575 | $700 |
| Wheelbase | 90 | 110 |
| Tires, front | 28 x 3 | 30 x 3½ |
| rear | 28 x 3 | 30 x 3½ |
| Drive | bevel | bevel |

Unit power-plants are used on both sizes, the Lycoming motor being employed. Details of the motors follow:

| | | |
|---|---|---|
| Capacity, lbs. | 500 | 1,000 |
| Bore | 2¾ | 3¼ |
| Stroke | 4 | 5 |
| S. A. E. horsepower | 12.08 | 16.92 |
| Speed, r. p. m. | 2,400 | 2,000 |
| m. p. h. | 40 | 40 |

Both motors are built for high speed and are block cast. They have their valves to the right, with inclosed mechanisms, and are cooled by thermo-syphon water circulation through cellular radiators. A Holley carbureter is used on the Junior and a Carter on the Senior.

The motors are not governed and Connecticut ignition is employed in connection with the lighting and starting battery of the Disco system.

A cone clutch on both models, or a multiple-disk type on the Senior, if preferred, transmit the power to three-speed selective gearsets bolted to the flywheel bell-housings, the control levers being mounted on the cover of the gearset in each case. Russel bevel-driven axles take the final drive from short shafts.

Front springs are semi-elliptic and rear springs three-quarters-elliptic on both models, those on the smaller acting as both torsion and propulsive members, while radius rods assist the springs on the larger. Frames are of pressed steel with integral spring-horns. Left steer and central control are used on both models.

Although the prices quoted in the above table refer to the chassis only, the vehicles are offered with the body complete as standard equipment at slightly higher prices. The Junior sells for $475 with an open-sided delivery body with a canopy top and side-curtains and the Senior at $785 with a panel body as shown.

## Little Giant Six-wheeler

ANNOUNCED in THE COMMERCIAL VEHICLE of August 1, 1915, the six-wheeled motor truck manufactured by the Chicago Pneumatic Tool Co., Chicago, under license from the Trailer Transportation Co., New York City, is now ready for the market. It consists of a 1½-ton Little Giant chassis and a two-wheeled dolly coupled to the rear thereof, as shown in the accompanying illustration. A fifth wheel upon the trailing dolly supports most of the body load, the front end resting on the load platform of the truck upon a ball-race so that it is free to move in relation to the truck.

The fifth wheel arrangement, in conjunction with the steering draw-bar attached to the end of the truck frame causes the trailing wheels to track exactly with the rear wheels of the truck. Thus the driver takes his turns just as sharply with the trailer as he would with the truck alone, although the load space permits of material 40 feet in length being carried.

## New 1-ton Garford

SIMILAR to the 1½-ton Garford described in THE COMMERCIAL VEHICLE of May 1, 1915, a new product has been placed on the market by the Garford Motor Truck Co., Lima, O. The new Garford is of 1 ton capacity and differs from the worm-driven 3,000-pounder only in the size and strength of principal parts. Other Garford models are the ¾-ton Garford-Utility, which is chain-driven, the 1½-ton worm-driven model, and the 2-, 3-, 5- and 6-ton chain-driven types. The main characteristics of the 1-tonner are:

| | |
|---|---|
| Capacity | 1 ton |
| Price | $1,420 |
| Wheelbase | 120 inches |
| Tires, front | 34 x 4½ |
| rear | 36 x 4 |
| Drive | worm |

The motor is located under the hood with the radiator in front and is the same one used on the ¾-tonner. It is mounted direct on the mainframe and is assembled with the clutch and gearset in a unit power plant. Details follow:

| | |
|---|---|
| Bore | 3½ |
| Stroke | 5¼ |
| S. A. E. horsepower | 19.60 |
| Speed, r. p. m. | 1,600 |
| m. p. h. | 17 |

It is cast in block with the valves to the right. Thermo-syphon water circulation cools the motor in conjunction with a cellular radiator.

A Krayfield carbureter, located on the left side, feeds the motor through passages confined entirely within the cylinder block and the throttle is governed by a Kramer suction governor located in the intake pipe.

Single magneto ignition is employed, the magneto being the new Dixie model Splitdort, hand controlled. Circulating splash lubrication is used.

A dry-disk clutch transmits the power to the three-speed selective gearset and a triple-jointed shaft from thence to the worm-driven rear axle. The axle reduction is 6½ to 1. Both worm and wheel run on ball bearings.

Both torque and propulsion are taken by the semi-elliptic rear springs. The frame is of pressed steel with integral front spring horns, the front springs being half-elliptic also. Brakes are all on the rear wheels, both hand and foot brakes acting on the same drums.

Pneumatic tires are used on the front wheels and solids on the rear, both single, as on the Garford-Utility, the front wheels having oval spokes and the rear, square ones. This permits the vehicle to make 17 miles an hour without undue vibration, while eliminating the bulk of tire trouble.

Left steer and center control are used and the spark and throttle levers are located on top of the steering wheel. The vehicle has the same dash and seat as on the 1½-tonner, the dash being of steel with a curved roman front, as used on all the larger Garfords, oil lights being inset in the dash. The seat is of a strictly truck type, with folding back-rests to permit of front access to the load.

Fig. 7—Little Giant six-wheeled truck, showing clearly the fifth wheel on trailing dolly and jointed draw-bar attached to rear of truck frame

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Passing through Times Square with a 35-ton armature

## Heavy Loads Motor Hauled

(Photographs Courtesy New York Edison Co.)

WHEN the New York Edison Co. came to equip its new rotary converter station at Thirty-ninth street between Broadway and Sixth avenue, New York City, the problem of hauling the heavy parts of these machines through the congested city streets was presented for solution. A year before, in equipping a similar station with 24-ton transformers, horse haulage was employed. This year not only were these heavy appliances to be hauled but the field coils and armatures of the converters as well.

The armatures weigh 35 tons apiece and besides being heavy are exceedingly bulky. Each converter consists of four pieces and weighs complete 420,000 pounds. There are two converters and two transformers in this station.

Stalled over the new subway cut at Seventh avenue and Forty-second street

Jacking up the sinking rear wheels

Richard Doughty, a man who tackles difficult jobs of this sort as a profession, was given the contract to get the parts from Thirtieth street and North river to the new station. Instead of twenty-four horses, he used two and sometimes three 5-ton Sampson trucks as tractors to draw his giant trailer the Infant, one of the largest in New York.

### To Stop Is to Stall

The only difficulty which was experienced was when traffic held the truck up on asphalt pavements, when the broad steel wheels of the trailer sunk into the street as though it had been made of soft mud. In these contingencies, the wheels had to be jacked up and planks laid beneath them.

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# Accessories for the Truck

## BANTAM BALL AND ROLLER BEARINGS

Bantam bearings, manufactured by the Bantam Anti-Friction Co., Bantam, Conn., are made in ball, straight-roller and conical-roller types for both radial and thrust loads. Radial-load ball bearings, although not carried in stock, are made for low, medium and high pressure work and consist of the conventional inner and outer races and a series of balls held in a two-piece retainer made up of two flat rings held together at three points by means of countersunk bolts.

Plain roller bearings made up of a series of longitudinal rollers held in notches in ring retainers at each end are manufactured on order, as are also a series of special roller bearings in which only the rollers inside of 80 degrees of the circumference of the shaft carry any load. The rollers in this type, instead of extending in one piece from the retainer on one end to that on the other, are cut into three parts, with the ends of each staggered in relation to those of adjacent rolls.

The Bantam company also makes a conical roller thrust bearing on order only. This consists of two races with angular grooves to suit the conical rollers. The outer or large-diameter end of each roller is cut with a spherical surface which is in contact with the outer sides of the race grooves. Each roller is in rolling contact with those adjacent to it as well as with the race grooves.

Plain roller thrust bearings are also made. These consist of two races at 90 degrees to the shaft with a flat plate retainer carrying a series of rollers whose longitudinal centerlines all pass through the centerline of the shaft. The rollers are straight-sided, but are each cut into four sections to make them turn readily and to prevent slipping. Although it is admitted that the construction of this type of bearing is theoretically wrong, it is nevertheless said to work perfectly in practice.

Ball thrust bearings are also made in several types, some carried in stock and others made on order only. One of the types carried in stock consists of two conventional races with a series of balls held in a U-shaped pressed steel retainer. Another type uses flat races with a white bronze retainer carrying two concentric rings of balls, the inner ones of which are staggered in relation to those of the outer.

Special types of single-row ball thrust bearings with bronze retainers and inside and outside double-row thrust bearings with flat seats or spherical seats, both types with bronze retainers, are also made on order only.

## COOPER UNIVERSAL JOINT

Similar to the conventional ball and socket arranged to bend to any angle, but with provision also for transmitting rotation from socket to ball, the Cooper universal joint, manufactured by the Cooper Flexible Transmission Co., Inc., New York City, consists of two main parts, the driving member and the driven member.

The driving member is made up of a conventional flange arranged for standard, square, or tapered shafts, to which is fastened a shell, spherically shaped internally. This shell is joined to the flange by means of a dovetailed spline and from two to eight cap-screws, according to the size of the joint. Four V-shaped pieces called jaws and somewhat similar to an orange slice are forced into the shell under pressure and held in place by means of four trunnions on opposite diameters at right angles to each other.

The driven member is made up of four crossheads inserted in the shell between the jaws of the driving member. Each crosshead has three flat surfaces at right angles, the other surface being spherical and bearing against the spherical interior of the shell. The spherical surface of the crosshead is grooved to form a recess for lubricant sufficient for 1 year's service. Two of the flat surfaces of each crosshead bear against opposite sides of the adjacent jaws while the remaining flat surface forms one side of a square opening in which the driven shaft is inserted.

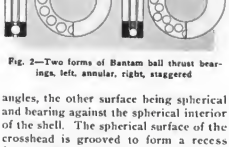

Fig. 2—Two forms of Bantam ball thrust bearings, left, annular, right, staggered

A cover, mounted on the driven shaft and held against the exterior of the shell by a spiral spring, excludes dust and retains the grease.

In operation, as the angle of the driven shaft varies, the crossheads slide between the jaws, from which they receive their drive, and against the spherical interior of the shell. A phantom view of the joint is shown in Fig. 1.

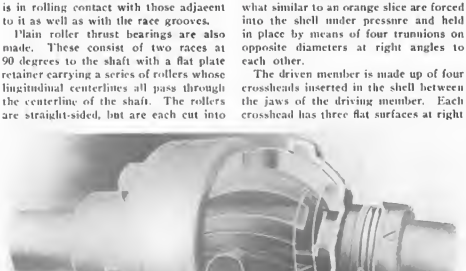

Fig. 1—Phantom view of Cooper universal, showing interlocking jaws and spring cover, partially cut away

## NEW WISCONSIN TRUCK MOTOR

Built for heavy-duty work, such as in motor trucks and tractors, but modern and embodying the features of compactness, accessibility, inclosure and long stroke which have resulted from the development of the passenger vehicle motor, Types TU and UU motors, built by the Wisconsin Motor Mfg. Co., Milwaukee, Wis., have just been placed upon the market.

Of the block type, with four cylinders, these motors are exactly similar except in bore, and all parts are interchangeable on the two motors, as far as possible. For example, the smaller cylinders bolt to the same crankcase and everything of importance except cylinders and pistons are the same.

Type TU is 4 by 6, bore and stroke, and Type UU, 4¼ by 6. Their valves are to the left, with their mechanisms inclosed by one removable pressed steel coverplate. Intake valves are fed by passages cored between the first and second and the third and fourth cylinders and a two-branch exterior manifold on the right side. The exhaust manifold is on the left side, and is located entirely above the valve coverplate.

The magneto is on the right, or carbureter side, driven off the timing gears, and the centrifugal water pump occupies a similar position to the left; thus the exhaust manifold, pump and valve tappets, the parts requiring the least attention, are on one side, while the magneto and carbureter, which require more, are on the other.

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Fig. 3—Wisconsin truck motor, showing clean exterior, grouping of accessories, mountings for generator and flywheel starter and forged steel supporting ring in back of flywheel bell-housing

Provision is made for a two-unit electric system, the generator to be driven by the pumpshaft and the motor to be geared to the flywheel. The generator and motor both are bolted to the flange of the crankcase and lie entirely below the cylinder block.

These motors are made in the now standard unit power-plant form, the flywheel bell-housing and the bottom of the crankcase being on one level at the bottom. The crankcase is of aluminum in two parts, the bell-housing integral. A single support is provided at the front and two at the rear. The rear support is in the form of a separate ring, back of the bell-housing, made of forged steel, to which the gearset bolts. This construction permits either the gearset or engine to be detached from the chassis without disturbing the other's support.

The crankshaft is supported on four bearings and the camshaft on three. The crankshaft is 2 inches in diameter. Valves are of 2¼-inch diameter and actuated by mushroom lifts.

Pressure lubrication is provided by a gear-pump at the lowest point in the crankcase, with a large removable plate at the bottom for draining, cleaning or inspection. It forces the oil through drillways in the crankshaft from the two middle main bearings to the connecting rod bearings, the overflow from these, in a fine mist lubricating the cylinders, wrist pins, and camshaft. Separate feeds oil the end bearings, the overflow from the front bearing running over the timing gears.

The oil reservoir is cast in the lower crankcase half and a plunger gauge in a glass tube on the right side, at the rear, shows the level of oil. The oil filler is just in front of the magneto. The camshaft has an extension in front which may be used to drive a distributer for a battery system, in addition to the magneto.

## DUNTLEY LOW OIL ANNUNCIATOR

Stopping the engine of a motor vehicle when the oil supply gets too low by short-circuiting the ignition system, the Duntley low oil annunciator, manufactured by the Duntley Products Sales Co., Chicago, consists of two vertical concentric fiber cylinders placed at some convenient point in the oil supply line. The oil on its way from the sump to the bearings enters the outer cylinder at its midpoint, passes up and around the space between the walls of the two cylinders, into the interior of the inner cylinder and then out through a coil of pipe at the bottom to the bearings.

The inner cylinder, while connected with the outer one at the top, does not extend clear down to the bottom of the outer but screws into a fibre cup with a hole at its center to permit the oil to pass down and out through a metal cap on the bottom. Through this cap is inserted an insulated binding post which extends up into the fiber cup to a metal washer fitted in the bottom of the latter.

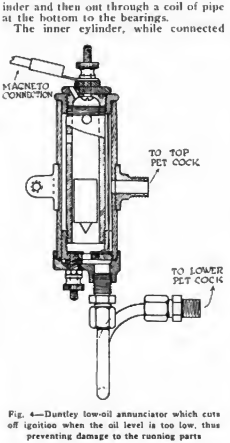


Fig. 4—Duntley low-oil annunciator which cuts off igoition when the oil level is too low, thus preventing damage to the runniog parts

The upper end of the inner fiber cylinder is screwed into a metal bushing which is provided with a second binding post. This bushing is a driving fit in the top of the outer cylinder, thus sealing the tops of both cylinders. This bushing is also connected with the metal washer in the bottom of the fiber cup by means of a thin wire rod extending down between the walls of the two cylinders. Both of the binding posts are connected with the ignition system.

A cylindrical cork float with a metal cone at its bottom is positioned inside of the inner cylinder.

In operation, as long as oil is passing through the annunciator the float with its metal point is kept off the washer in the bottom of the fiber cup, but as soon as the oil supply becomes sufficiently low that none passes through, the float drops to the bottom, the metal point touching the washer, completing a circuit and short-circuiting the ignition system.

The instrument does not stop the motor suddenly, as the oil is gradually being burned up and the operator can discover when his oil is getting low by the fact that the engine will commence to miss in one or two cylinders for several minutes before stopping altogether. A sectional view of the device is shown in Fig. 4.

## NARCO TIRE-CUT FILLER

Offering a convenient means of patching up small cuts and scratches in pneumatic tire casings before they become harmful by growing larger, Narco tire-cut filler, marketed by the H. W. Johns-Manville Co., New York City, is a rubber solution with other ingredients which welds itself to the walls of the cut and loosened tread and which solidifies quickly and remains an integral part of the tire.

Narco is supplied in two sizes of tubes, each of which has a tapering spout for easy and quick application.

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# Men and Makers

**STUDEBAKER CORP.,** Detroit, will soon occupy its new building being erected for the enameling and stamping department. It is 320 feet long by 70 feet wide, four stories high, and is to be known as plant No. 27. The most modern type of quantity enameling apparatus is being installed. The air in the enameling room is to be washed by a special device and the walls are to be specially prepared to catch any dust or dirt in the air. A large bank of enameling organs will take care of the dipped metal parts.

**Mogul Motor Truck Co.,** St. Louis, Mo., is planning to erect a large assembling plant on Forest Park boulevard, west of Sarah street, to take care of increased orders. The new structure will be a modern daylight factory with every known modern appliance to facilitate the rapid assembling of motor trucks. The company has also purchased enough ground west of the new building to enable it to erect a new addition for storage and repairwork.

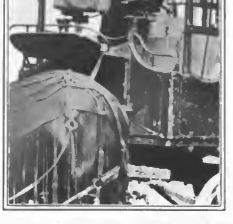
**Moreland Motor Truck Co.,** Los Angeles, Cal., is planning to more than double its production, so that approximately 100 motor trucks will be manufactured per month. Moreland distributing and service stations are to be established in all the important towns of southern California.

**Touraine Co.,** Broad and Huntington streets, Philadelphia, Pa., manufacturer of the 1,000-pound Vim, has just had plans prepared for a new factory building, 85 by 250 feet, to be erected at the northeastern corner of Twentieth street and Montgomery avenue.

**J. C. Wilson Co.,** Detroit, has moved its motor truck department from 79 and 81 Adams avenue, west, to the large plant at Warren avenue and Sixteenth street, where preparations are well under way to start manufacturing on a large scale.

**Rush Delivery Car Co., Inc.,** Philadelphia, Pa., has just leased the recently-constructed four-story and basement building at 1007 north Front street, for the manufacture of commercial vehicles.

**Velie Motor Co.,** Kansas City, Mo., has recently been incorporated with a capital stock of $25,000 for the distribution of Velie motor products in the Kansas City territory. It succeeds the Velie-Thorp Motor Co. in this field. The Velie company is establishing itself at 1616 McGee street, in a new one-story structure with 64 feet frontage, a display room 50 feet deep, and a large service room in the rear. The entire equipment will be new. The officers of the new company are: E. D. Davenport, president; H. H. Hutchinson, vice president; Carl Zellers, secretary, and H. C. Rings, treasurer.



Modern traffic conditions, induced by the high speed and efficiency of motor trucks have made the lusty voice of the teamster impotent against the mechanical noise of the motor vehicle warning signal, and so it has been found advisable for some teamsters to equip their wagons with motor vehicle warning signals. The Stewart-Warner Speedometer Corp. has placed Stewart band horns on all its horse wagons, as illustrated above

**General Auto Service Co.,** formerly at 1619 McGee street, Kansas City, Mo., will move soon to the Hesse building, now under construction, at Seventeenth and Oak streets. The company will occupy two-thirds of the first floor and the entire second floor of this building, which is being erected as an addition to its present quarters by the Hesse Carriage Wks. The General Auto Service company will have 58 by 110 feet on the first floor and 83 by 110 feet on the second. The company now does service work for the International Motor Co., the Westinghouse Electric & Mfg. Co., the B. F. Goodrich Rubber Co., the General Motors Truck Co. and the Ever Ready Non-Sulphating Storage Battery Co. The company has its own generating plant for storage batteries for lighting and ignition and probably will later equip for handling batteries of electric trucks.

**Studebaker Corp.,** Detroit, will hereafter build all of its motor vehicles for foreign market at the Canadian plant in Walkerville, Ont.

**Bachrach's Garage & Taxicab Co.,** Manila, P. I., has just completed a new garage and sales office between Railroad and Chicago avenues in that city for the sale and maintenance of American-made motor trucks and passenger cars, which is said to be the largest building of its kind in the Orient. The new building is two stories high and has 31,750 square feet of floor space. The concern acts as agents for White, Garford-Utility and Garford motor trucks. A complete description of the building with many illustrations appeared in the Cablenews-American, a Manila newspaper, under date of June 27, 1915.

**Continental Motor Mfg. Co.,** Detroit, is rushing to completion the five factory additions to its Detroit and Muskegon, Mich., plants which will make it possible for the company to increase its production to over 500 motors daily. The Detroit plant last year produced an average of 100 motors per day. During the next 60 days this schedule will be increased to approximately 300 motors a day.

**Clayton & Lambert Mfg. Co.,** Detroit, Mich., manufacturer of a line of patented firepots, torches and brazers, has recently added a new sheet-metal stamping department for the manufacture of motor vehicle fenders, hoods, tanks and other sheet-metal parts.

**Beam Motorcar Co.,** Cathedral and Chase streets, Baltimore, Md., has recently become the service and sales station for Philadelphia storage batteries, made by the Philadelphia Storage Battery Co., Philadelphia, Pa.

**Superior Lamp Mfg. Co.,** 136 west Fifty-second street, New York City, manufacturer of Superior streamline hoods for motor vehicles, has just obtained a United States letters patent on this device, made out to Harry Futterman, but controlled by the Superior company.

**Detroit Steel Products Co.,** Detroit, has just installed a new type of furnace for heat treating motor vehicle springs which is said to be the only one of its kind in the world. The new furnace is designed to insure a continuous and mathematically-even high temperature. It has the appearance of a giant mushroom with the stem cut off. It is 26 feet in diameter and 81.7 feet in circumference. The furnace is of the oil-burning type and is operated by electricity. The floor of the unit revolves, making one complete revolution in from 20 to 30 minutes. Jets of air and fuel oil at intervals around the outside circumference shoot into the furnace at great velocity through vents in the walls. The oil is ignited through contact with the heated interior, keeping its temperature between 1,450 and 1,575 degrees Fahrenheit. Ten pyrometers register the temperature and an electric signal-board notifies the operator whenever it threatens to get too high or too low. When the furnace is in operation the cold springs to be treated are placed on the revolving floor. During the revolution they gradually attain the maximum predetermined heat of the fur-

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nace and are taken out at the end of that revolution to be hardened in oil baths One crew of men removes the heated springs as the revolving floor brings them into position, while another crew inserts other leaves. The new furnace does the work of four or more ordinary furnaces. Its operation requires seven men and it treats about 50,000 pounds of steel per day.

**Kelly-Springfield Tire Co.,** Springfield, O., has just published a statement showing that its net earnings for the first half of 1915 were in excess of $700,000. The net earnings for 1914 were $1,215,144, and officials of the company believe that this year will bring the net earnings up to $1,500,000.

**Firestone Tire & Rubber Co.'s** Los Angeles, Cal., branch has leased the room adjoining its location at 1239 south Olive street and will thus acquire 5,000 additional feet of floor space.

**Firestone Tire & Rubber Co.'s** plant at Philadelphia, Pa., which heretofore has occupied a part of the structure known as the Industrial Art building, now takes in the whole building, thus doubling the space used previously.

**Goodyear Tire & Rubber Co.,** Akron, O., is progressing rapidly in the work on its five new buildings now under way at the Akron plant. Steel-sash construction is being used throughout and will make the buildings unusually light and airy. It is expected that an additional force of 2,000 persons will be employed at the completion of these additions.

**New Process Gear Corp.,** Syracuse, N. Y., has purchased the Monarch Typewriter plant of the Remington Typewriter Co., in that city, for a sum said to be more than $200,000. Possession will be taken October 1 next.

**Duff Mfg. Co.,** Pittsburgh, Pa., manufacturer of the Barrett lifting jacks, is now building an extension to its main plant. The new addition will be 130 by 125 feet and will make the main building 625 feet long and 125 feet wide. All the new equipment has been furnished and is now being installed.

**Ford-Clark Co.,** Cleveland, O., has just equipped a plant at 6536 Carnegie avenue, for the special purpose of supplying jobbers, dealers, garage and repairmen with motor vehicle parts formerly difficult to obtain in small quantities for repair and replacement purposes. The officers of the company are: L. J. Ford, formerly with the Steel Products Co., Cleveland, O., president; A. C. Clark, formerly with the Detroit Seamless Steel Tube Co., Detroit, vice president, and K. L. Bracken, secretary and treasurer.

**Hartford Machine Screw Co.,** Hartford, Conn., is rushing to completion two new buildings, one a six-story structure, 200 feet by 465 feet, and the other a large two-story building with a convenient railroad siding which will improve shipping facilities considerably. The two new buildings will increase the floor space of the entire plant by about 80,000 square feet. In addition to housing the new general offices of the company, the new buildings will afford space for extensive additions to the manufacturing departments of the plant. It is expected that the new buildings will be completely occupied and running at full capacity by September 2.

**Gisholt Machine Co.,** Madison, Wis., is planning to erect two new buildings, a machine shop 175 by 112 feet, and a storehouse 44 by 112 feet. The new buildings are made necessary by a large increase in orders for lathes and other tools from the motor vehicle industry.

**Linde Air Products Co.,** New York City, has just purchased a large factory site at Thirty-eighth and National avenues, Milwaukee, Wis., for the purpose of serving Milwaukee and Wisconsin users of welding and cutting apparatus. The site is 150 by 700 feet and is located on the belt-line railroad. A concrete-and-brick building, one story high, 150 by 250 feet, to cost about $50,000, will be erected and 100 operatives engaged for its maintenance. Until now the Chicago branch has been supplying this territory, but the growth of the use of the oxygen welding and cutting process, together with the use of the equipment for cleaning motor vehicle gasoline engines, has necessitated the establishment of a direct branch in the heart of the Milwaukee manufacturing district.

**National Tube Co.,** Pittsburgh, Pa., manufacturer of National tubular and allied products, some of which are used in motor truck construction, has just brought out the National Bulletin, No. 20, which contains a complete index for all bulletins previously published. This index should be of considerable value in supplying a compendium of the contents of bulletins No. 1 to 20 and helpful in securing the required information on any specific subject contained in them.

**H. T. Woolson** has recently been appointed engineer of the commercial vehicle department of the Packard Motor Car Co., Detroit. He was formerly engineer of the Gas Engine & Power Co., Morris Heights, N. Y.

**R. I. Schramm,** until recently assistant advertising manager of the Packard Motor Car Co., Detroit, has become distributer for the Ford Motor Co. of Canada, Ltd., in Ottawa, Can.

**S. A. McGonigal** has just been promoted to the office management of the Detroit plants of the Studebaker Corp.

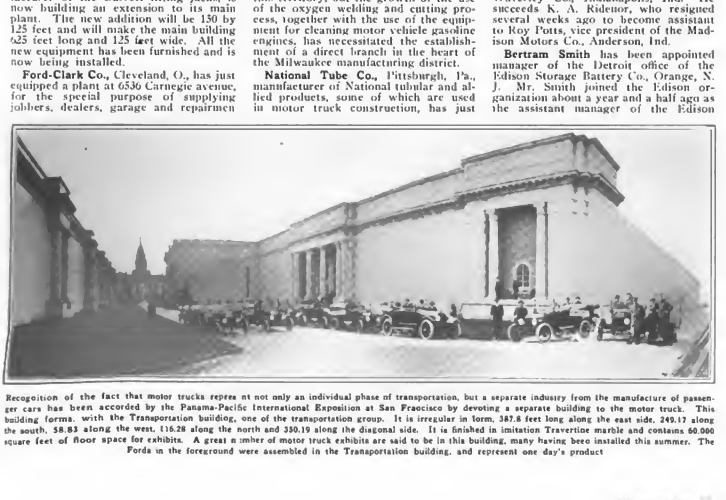
**W. S. Hughes** has recently been appointed chief engineer and production manager of the Falcon Motor Truck Co., Detroit, Mich.

**L. E. McKenzie,** formerly in charge of the interests of the Studebaker Corp. in Pittsburgh, Pa., has recently been appointed assistant manager of the Portland, Ore., branch, succeeding Clete Mutick, who has been transferred to the Studebaker branch in San Francisco, Cal.

**William Spalding,** Portland, Ore., representative of the Milburn Wagon Co., Toledo, O., and the Walker Vehicle Co., Chicago, Ill., both makers of electric trucks, has been appointed district manager for the Milburn interests in Oregon, Washington, Idaho and British Columbia.

**S. E. Barnwell,** formerly sales manager of the motor truck department of the Kentucky Wagon Mfg. Co., Louisville, Ky., has recently been appointed manager of the Louisville office of the Waverley Co., Indianapolis, Ind. He succeeds K. A. Ridenor, who resigned several weeks ago to become assistant to Roy Potts, vice president of the Madison Motors Co., Anderson, Ind.

**Bertram Smith** has been appointed manager of the Detroit office of the Edison Storage Battery Co., Orange, N. J. Mr. Smith joined the Edison organization about a year and a half ago as the assistant manager of the Edison



Recognition of the fact that motor trucks represent not only an individual phase of transportation, but a separate industry from the manufacture of passenger cars has been accorded by the Panama-Pacific International Exposition at San Francisco by devoting a separate building to the motor truck. This building forms, with the Transportation building, one of the transportation group. It is irregular in form, 387.8 feet long along the east side, 249.17 along the south, 58.83 along the west, 116.28 along the north and 350.19 along the diagonal side. It is finished in imitation Travertine marble and contains 60,000 square feet of floor space for exhibits. A great number of motor truck exhibits are said to be in this building, many having been installed this summer. The Fords in the foreground were assembled in the Transportation building, and represent one day's product

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Storage Battery Supply Co., San Francisco, Cal. Directly previous to his connection with the Edison company he was manager of the battery department in the Chicago branch of the United States Light & Heating Co., Niagara Falls, N. Y. He was formerly secretary and treasurer of the National Battery Co., Buffalo, N. Y., until its consolidation with the United States Light & Heating Co.

**E. B. Reeser** has been appointed assistant district manager of the Detroit offices of the Willard Storage Battery Co., Cleveland, O. Mr. Reeser was formerly manager of the Kellogg Mfg. Co. and more recently was traveling for the Willard company.

**F. P. Sherbondy,** chief electrician of S. F. Bowser & Co., Ft. Wayne, Ind., for the past 5 years, has resigned and assumed the management of the new Exide storage battery and service station in South Bend, Ind.

**George C. Brainard** has been promoted from assistant sales manager to chief engineer of the Hydraulic Pressed Steel Co., Cleveland, O. Mr. Brainard has been with the company for about 1 year.

**Clifford Knoble** has recently been made assistant advertising manager of the Hyatt Roller Bearing Co., Detroit, Mich. He will assist W. E. Biggers in handling the Hyatt co-operative work among dealers as well as in general advertising. Mr. Knoble was formerly with the National Cash Register Co., Dayton, O.

**Goodyear National Guard Members,** who recently attended the summer camp of the Ohio militia at Yellow Springs, were paid full time for the time spent in maneuvers. The Goodyear Tire & Rubber Co. encourages its employes to become members of the National Guard and offers full pay for the time spent in camp as an inducement to this end.

**Ralph H. Upson,** of the Goodyear Tire & Rubber Co., Akron, O., has been appointed to the advisory committee of the Naval Board recently formed in Washington, D. C., for the purpose of aiding the officials of the United States Government in increasing the efficiency of Uncle Sam's armed forces.

**J. J. Baeder** has recently been transferred from the Cleveland, O., branch of the Stewart-Warner Speedometer Corp., Chicago, Ill., to the branch in Detroit, where he will succeed R. H. Canary as traveling representative in the State of Michigan. He has been a member of the Stewart-Warner organization for 3 years.

**O. P. Hand** has been appointed director of publicity for the Bard High Compression Ring Co., Rockford, Ill. Mr. Hand was formerly advertising manager for the Minneapolis Iron Store Co., Minneapolis, Minn., a large manufacturing and jobbing concern of that city. Mr. Hand will assume his new duties at once.

**Martin's Patent Rocking Fifth-wheel,** the invention of C. H. Martin, Springfield, Mass., and which was described in full in the July 15, 1915, issue of THE COMMERCIAL VEHICLE, is pictured and described in an 8½ by 11-inch booklet of 12 pages just published by Mr. Martin. The new pamphlet pictures and describes the device fully and contains many line drawings showing the advantages of trailer use.

**Bureau of Foreign & Domestic Commerce Branch Offices** are now maintained in eight cities in the United States, where business men may avail themselves of the service offered by the bureau in Washington, D. C. Reserved addresses

If the Brobdingnagians equipped a department store with cash and bundle carriers, such as commonly used, they would probably be of about the size illustrated above. These carriers, however, are not used in the land of the giants, but in Detroit, U. S. A., at the plant of the Studebaker Corp., makers of Studebaker delivery vehicles and passenger cars. It is used to transport wheels, bodies, fenders, etc., from the new enameling department, next to the sheet metal room, to the assembling department. Before it was used these parts had to be trucked over the floor, down elevators, through tunnels and again up elevators in a devious, round-about way. Now this aerial tramway carries them in a direct line 780 feet long over the roofs of the humming shops. There are several spans, the longest of which is 178 feet. There are two cables for going and return trolleys, the cable measuring 1½ inch. A moving tow cable runs above the riding cable, operated by a 10-horsepower electric motor. It was installed by the Lamson Co., Boston, Mass.

of persons or companies desiring information about motor trucks as published from time to time in Commerce Reports, under the heading Foreign Trade Opportunities, may be secured from any of the branch offices by application in writing. The list of the branch offices follow: New York City, room 409, United States custom house; Chicago, 504 Federal building; Boston, Mass., 752 Oliver building; St. Louis, Mo., 402 Third National Bank building; Atlanta, Ga., 521 Post Office building; New Orleans, La., 1020 Hibernia Bank building; San Francisco, Cal., 306 United States custom house; Seattle, Wash., 922 Alaska building. Under special arrangements the chambers of commerce of Cleveland, O., Los Angeles, Cal., and Cincinnati, O., co-operate with the bureau and perform the same service as the branch offices in the other cities.

**"Abuses and Dangers of Makeshift Jitneys"** is the title of a one-page pamphlet recently published by the Garford Motor Truck Co., Lima, O., and which contains a letter entitled, "Future of the Motor Bus Will Not Be Along Lines of Present Jitney," written by S. M. Williams, sales manager of the Garford company and published originally in the July 15, 1915, issue of THE COMMERCIAL VEHICLE. According to Mr. Williams, the progress of motor bus transportation, whether in the hands of public service corporations or in the hands of private individuals, depends upon three main conditions, as follows: 1—Reliability and dependability of service. 2—Improvement of street conditions in the average city to assure the lowest cost of maintenance. 3—The selection of the equipment after a careful study of the requirements in order to insure comfort and safety equal to that offered by competitive service. A group of seven illustrations showing jitney buses in use in several cities complete the pamphlet.

**"The Firestone"** is the title of the new house organ of the Firestone Tire & Rubber Co., Akron, O., the initial number of which was published in July. It is intended for circulation among all the employes of the Firestone company, including those in the many branches throughout the country. The July issue is given over to announcements concerning the new factory additions at Akron—reported in the August 1, 1915, issue of THE COMMERCIAL VEHICLE—the contemplated club house for employes and news items about employes and their activities. The August number contains an account of the Firestone picnic held at Silver Lake on July 31, at which 15,000 members of the Firestone organization were present.

**"The Bowser Boomer,"** the house organ of S. F. Bowser & Co., Inc., Ft. Wayne, Ind., in the August issue contains a very full description with illustrations of the exhibit of the company at the Panama-Pacific Exposition at San Francisco. This exhibit has just been awarded the grand prize and gold medal, the highest possible award, for portable and stationary gasoline tank and filling systems.

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# LOCOMOBILE *Worm Drive* TRUCKS

## *WHY DO THEY BUY THEM?*

**The Managing Officer**

Because he knows that it is the wisest policy to buy the **best** when he buys machinery. There are no good tools but the best tools. Business can only grow when it has good men and good machinery.

**The Purchasing Agent**

Because Locomobile Truck quality is the highest for the price, and the reputation of the company is a guarantee of the quality.

**The Transportation Manager**

Because he buys a truck on points, the same as he buys a horse, and the Locomobile has the most good features. Check over, point by point, compare part by part, the Locomobile with other trucks, and you cannot help but be convinced.

**The Truck Driver**

Because he knows he can leave the Locomobile Truck at night when he knows the day's work is over and does not have to stay and work over it. When morning comes he can start right out with his truck without any delay. He likes it because it starts easily and steers easily also.

The Locomobile Truck is made in 2, 3, 4, 5 and 6 ton sizes.

**PRICE THREE TON CHASSIS, $3500**

Send for Catalog, Information on Deliveries, Demonstrations, Bodies, Loading and Unloading Devices, and other information.

We go anywhere for business. National Branch House Service System.

***THE LOCOMOBILE COMPANY OF AMERICA*** ***Bridgeport, Conn.***

**Locomobile in Connecticut State Service**




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## Four-Wheel Drive Specifications

Wheelbase—3 ton, 122 inches; 6-ton, 140 inches.

Steering—Motor power (operated by hand lever) on all wheels giving positive action to a powerful, sure, fool-proof steering device which makes a remarkably short-turning radius.

Axles—Special patented full floating. Bearings—Rhineland.

Motor—3 tons, 4¼ x 6¼ Waukesha, 5½ x 7 Morton.

Transmission — Morton Selective 4 speeds forward, 1 reverse. Double worm drive to all wheels.

## Morton Worm Drive Specifications

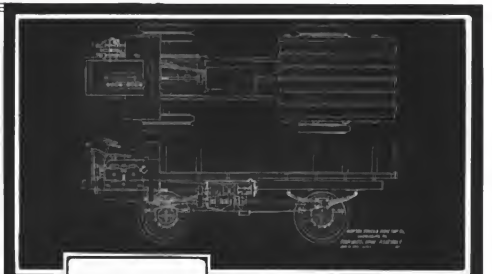
Motor—Continental—4 cyl.—4 cycle.

Carburetor—Carter.

Ignition—Bosch.

Lubrication — Positive plunger pump with constant level.

Centrifugal water pump. Hele-Shaw clutch. Selective transmission. Lever control. Right hand drive. Solid forged axles. Worm-Wheel of special phosphor bronze. All other equipment equally reliable.



Showing the equal power distribution of the Morton Four-Wheel Drive assembly

# MORTON

Four-Wheel Drive equally distributes the propelling strain over the four axles giving the highest efficiency because every pound of energy is turned into a distributed tractive effort. Morton Four-Wheel Drive Trucks in 3 to 6 ton capacity, are built to withstand the hardest usage and to mount the heaviest grades.

**Morton Worm Drive Trucks**

**1½—2—2½—3½—5 Tons**

Are the perfect vehicles of the light truck field.

## Extra Money For You

Aside from the regular truck business you can increase your earnings and the efficiency of your local fire department by interesting town officials in the finest combination hose and chemical wagon ever built.

Designed by capable engineers who provided every conceivable means for making this a dependable fire fighting unit that will get to a fire, regardless of the road it has to travel. The Morton Hose and Chemical Wagon is built of the best material, by the most skilled mechanics obtainable.

Electric starting, lighting and ignition systems are installed in such manner as to make failure to operate an impossibility. Simplicity is the keynote throughout.

Motor—Continental—6 cylinder four cycle, water cooled, 4⅛ x 5¼—60 H. P. of the unit power plant type. Starting and Lighting—Jesco Combined Starting and Lighting Systems. Carburetor — Carter. Drive—Worm Gear. Brakes—service and emergency on rear wheels. Steering Gear—Irreversible type.

Guaranteed against defective workmanship or material for one year.

Equipment—2 35-gal. chemical tanks connected with by-pass, 200 ft. of ¾-in. chemical hose, 1 extension truss ladder, 1 solid side roof ladder, 2 axes, 2 bars, 8-ft. pole, 2 3-gal. hand extinguishers, acid receptacle, plug for nozzle and all tools for operating tanks and devices.

Morton Truck and Tractor Company's combination hose and chemical wagon.

*Dealers—Communicate for Open Territory*

**Morton Truck & Tractor Company**

Harrisburg Pennsylvania



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# Truck Tires Free

## Unless the Goodyear S-V Outwears Any Other

**We now extend this Guarantee to October 1st. Many truck owners were not in shape to accept it during April, May and June. And we want every user to have this chance to prove the S-V best.**

*Equip opposite wheels—at the same time—one with a Goodyear S-V, one with any other standard Truck Tire of like rated size, bought in the open market. If the Goodyear S-V fails to cost less per mile than the other, we will return you its full purchase price, making the S-V free.*

Get this guarantee in writing when the tires go on. Equip all the wheels you wish. Compare the Goodyear S-V with every seeming rival in this convincing way. Then you will end all your costly experimenting. Then you will know the truth.

## Mileage Warrants Foolish

The habit has been, with us and with others, to give mileage warrants on Truck Tires. But that's unfair, either to you or us.

Small tires can't do what big tires do. No tire on hard roads can match good-road mileage. A mileage warrant is a simple guess on average conditions. And it must be low enough to meet bad situations.

What we can do—what we do—is to guarantee the lowest cost per mile under like conditions. We guarantee that on the Goodyear S-V, against any tire that's built.

Not alone in the limited, cautious way in which mileage is usually guaranteed. Not only on an adjustment basis. The Goodyear S-V is entirely free, however long you use it, if any tire you match against it shows as low a cost per mile.

### Why We Dare

We dare do this because we have already made 5000 tests and comparisons. Barring accidents, the Goodyear S-V will surely win against any rival Truck Tire. There are reasons for it. One is more available tread rubber. Another is no creeping, no bulging or breaking, no possible separation. The tread, the backing and the rim are one.

Our local branch will tell you where to get the S-V tires under this signed warrant.

GOODYEAR
AKRON, OHIO
S-V Truck Tires

**THE GOODYEAR TIRE & RUBBER CO., Desk 86, AKRON, OHIO**
**Makers of Goodyear Fortified Automobile Tires**
**We Make Demountable, Block, Cushion, Pneumatic and Other Types of Truck Tires**



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**Prevents Speeding**

of the truck by the one practical method: interrupting the ignition.

## Steele's Speed Limit Control

is a simple, dependable device for cutting out the spark when the rev. per min. rise above a pre-determined limit.

Saves both motor and truck by an absolutely automatic ignition cut-out, not interfering in any way with the driver's control of the throttle.

Truck and motor troubles are *very largely* caused by overspeeding; why not stop them off short?

Send for full description and our dealers' proposition.

**W. M. STEELE**

98 Beacon St., Worcester, Mass.



**WEST'S CAST-STEEL WHEELS** *for* MOTOR TRUCKS

**Are used by America's leading Truck Builders**

These wheels were designed by, and are built under the supervision of, experienced engineers. They have been thoroughly tested and have proved they will stand hard usage and abuse.

Over 8,000 WEST'S CAST-STEEL WHEELS are now used on trucks and not one of them has failed to give satisfaction.

Specify WEST'S CAST-STEEL WHEELS on every heavy truck you buy.

**The West Steel Casting Company**

8 05-815 E. 70th St. Cleveland, Ohio

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# Bearings

We carry in stock for immediate delivery, various types and sizes of Ball and Roller Bearings.

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WYMAN and GORDON FORGINGS

*and guarantee the product*

The Wyman & Gordon Co.

Worcester Cleveland Detroit

**TORBENSEN**

**Internal Gear Drive Axles**

are the logical final drives for all heavy duty trucks because their design and construction combines lightness and strength far beyond the possibilities of any other axle and in so doing opposes a dead axle to the load while applying a live axle to the transmission of power to the drive wheels. As a result they show increased efficiency at lower average maintenance cost throughout a period of life double that of the average axle.

**TORBENSEN GEAR & AXLE CO.**

E. 72nd St. and L. S. & M. S. R. R. CLEVELAND, O.

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**Sensitive Control, Closely Following the Road Conditions**

as the truck encounters good roads and bad, up hill and down—every possible influence of surface and grade—leaving nothing for the driver to do but steer.

The Krebs

# Automatically Governed Worm Driven

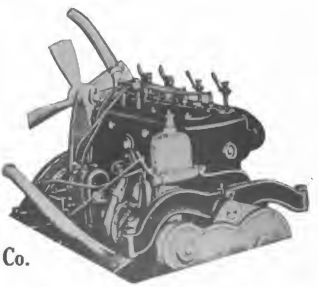
# Truck

In this modern truck the driver's work is simplified and reduced to the legitimate work of the vehicle driver: watching the traffic.

The control of the motor is taken care of by the KREBS Governor, an automatic device which operates like the unerring hand of an expert, maintaining the schedule under the changing conditions of the trip and at the same time economizing gas and saving the truck and tires. This device is not a mere speed-limit, but actually **governs** the entire handling of the motor. It sensitively and immediately corrects the spark advance and opens or closes the throttle, by gradual degrees, to meet the road conditions as they change from moment to moment.

The KREBS Truck is also equipped with worm drive, admittedly the most efficient, silent and serviceable method. Our worm drive is properly constructed and mounted, and is the identical form successfully employed in Europe for years. Other meritorious features are the location of the radiator behind the motor, Continental motor (equipped with the Automatic Governor), center control, left hand steer, full floating rear axle, bodies to fit all trades and industries.

We have been building motor cars and trucks since 1899 and this KREBS truck is by all odds the best commercial vehicle we have ever brought out.



**The Krebs Commercial Car Co.**

CLYDE, OHIO



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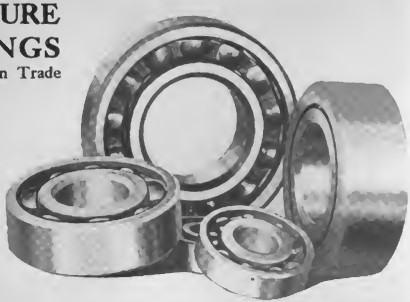
American Made for American Trade



# In the last analysis uniform *Quality Guaranteed* is what counts

—and especially is this true of ball bearings, the most competent of anti-friction bearings yet devised.

—The knowledge, experience and skill of New Departure Engineers, Chemists, Metallurgists and Trained Workmen, combined with unlimited resources and pains-taking service, have made New Departure Ball Bearings the Standard of Quality and Uniformity among builders of American motor cars.

**Send for the New Departure "Brown Book"**

## THE NEW DEPARTURE MFG. CO.

**BRISTOL, CONN., U. S. A.**
**Conrad Patents Licensees**

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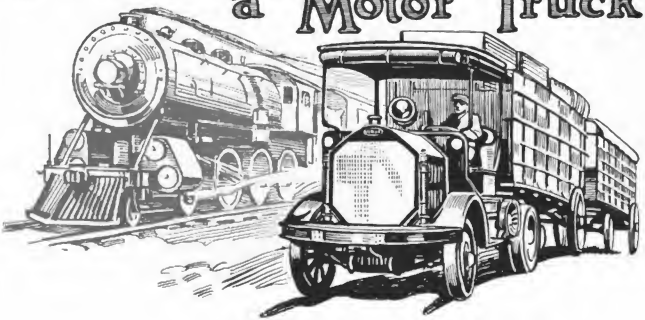
# The Knox Tractor is not a Motor Truck



Knox FOUR-WHEEL TRACTOR

It produces power in the same way as a motor truck but applies its power the same as a locomotive—hauling the load instead of carrying it.

Its field is limited to heavy hauling but in its field it knows practically no limits in loads, distances and endurances.

Just as a weak man can drag a weight he cannot lift, just as a strong man can drag a bigger load than he can carry—just as railroads have proven longer than the memory of man that a locomotive can pull many times its own weight, however bad the traction, just as the puny looking tug can pull a huge liner or a string of scows about with ease—so does the Knox Tractor furnish not only the logical production and application of power to the moving of heavy loads but it does so far more efficiently than the truck and infinitely more economically—even making it practicable to utilize present vehicles to advantage rather than charging them off to "loss" when changing from "horse" to "automatic transportation."

For particulars and full information address

**The Knox Motors Associates**
**SPRINGFIELD, MASS.**

New York, 1872 Broadway — Boston, 825 Tremont Bldg. — Chicago, 1621 Michigan Ave.
Philadelphia, 604 Abbott Bldg. — Kansas City, 1725 McGee St.



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# Firestone TRUCK TIRES

## There Is a Firestone for More Economy —More Miles in Your Truck Service

THOUGH there is a special Firestone tire to meet each particular need they have two qualities in common—extreme toughness, giving longest wear, and resiliency that insures protection to the truck mechanism. This is a Firestone success, so far unmatched. Proof is found in the preference given to Firestone tires by truck owners of the largest experience. Almost twice as many Firestone truck tires are in use as of any other one make.

Two of the many types of Firestone Tires are here shown—the Pressed-on type for heavy duty (on the left) and the Clincher Flange for I H C trucks (on the right).

The Firestone Truck Tire service is of very great advantage to every truck owner or prospective purchaser. In every large trucking center there is a Firestone Service Station with experts who will be glad to advise with you. This implies no obligation whatever. Call the station near you. Or write us for details and low prices.

**Firestone Tire & Rubber Co.**

*"America's Largest Exclusive Tire and Rim Makers"*

**Akron, Ohio**—Branches and Dealers Everywhere




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# MODERN 1915

## GET IN LINE

With your co-operation, we are able to supply you with just the truck that will give the most satisfactory and profitable results in your business—Chain or Worm drive models.

**Model "H" 1½ Ton Chain Drive. Model "L" 1 Ton Worm Drive**
**Model "M" 1½ Ton Worm Drive. Model "P" 2 Ton Chain Drive**

**The Bowling Green Motor Truck Co., Bowling Green, Ohio**

## What Motor Truck Manufacturers Say—

***"If it's made of felt, ask Booth"***

We have this distinction for **Quality and Prompt Service** and being Specialists in all felt requirements.

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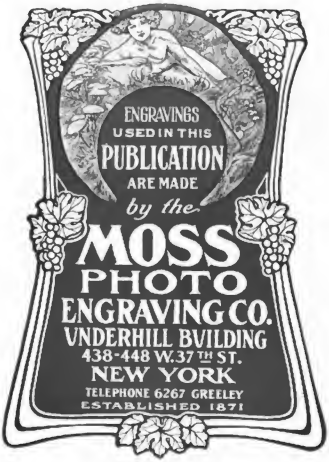


## U. S. MOTOR TRUCKS

—have won the confidence of their owners throughout the world by 5 years of matchless performance, service and durability.

RELIABLE DEALERS WANTED

The Agency is a Valuable Asset

Capacity
2 Ton
2½ Ton
3 Ton
4 Ton

If you are considering taking on an agency, or should be dissatisfied with present arrangements, WRITE US. Our proposition is a money-maker. Address Contract Dept. D.

**THE UNITED STATES MOTOR TRUCK CO., Cincinnati, Ohio**


SPECIAL ISSUE

OF

THE COMMERCIAL VEHICLE

OCTOBER 1, 1915

SEE ANNOUNCEMENT ON PAGE 3



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## Always on the Job

Standard DETROIT USA

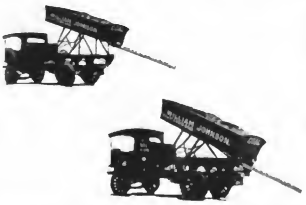
CHAIN AND CHAINLESS
TRUCKS

**Dealers Receive Real Cooperation**

STANDARD Trucks have been sold in almost every large city of the U. S. A. with practically no advertising, which demonstrates that the remarkable mechanical perfection of STANDARD Trucks have won and held the confidence of the buying public. It will pay "live dealers" to investigate our very liberal agency proposition. Send for Booklet B-26 describing all capacities.

**Standard Motor Truck Co., Detroit, Mich.**

## 3-Ton Soft Coal Body

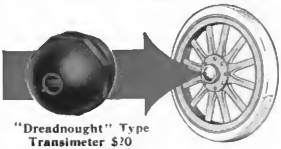


For over two years this three-ton Garford, New Ideal equipped, has been in constant hard daily use and has given perfect satisfaction. Built for handling soft coal it has an especially high front lift. Hand hoist and rear delivery.

Write us regarding your special problem. New Ideal Bodies are made to meet your specifications and for any size or length chassis. Can be sent anywhere and easily mounted. Two to ten tons. Hand or power hoist.

**New Ideal Wagon Works**

1845-47 Park Avenue, near 126th Street, New York



"Dreadnought" Type
**Transimeter $20**
*(Guaranteed Indestructible)*

## Accurate Truck Records

enable you to put your finger on the leak in your delivery costs—to get the results you pay for.

## TRANSIMETER

**(Hub Odometer)**

keeps an accurate mileage record.

It is dirt- and dust-proof—glass window keeps clean on the inside. Figures do not revolve—always right side up and easily read.

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**Booklet on request**

**AMERICAN TAXIMETER COMPANY**

*Mfgrs of Jones and Popp Taximeters*

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**MONONGAHELA, PA.**

QUICK DELIVERIES

STYLE F. A. 2050

**Front and Rear Axles Complete with Roller Bearings** **Springs—High Carbon or Alloy Steels**




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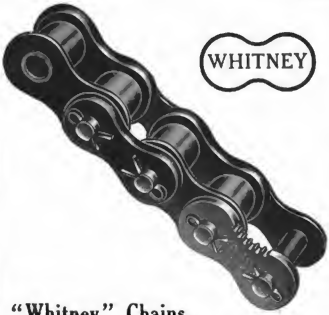


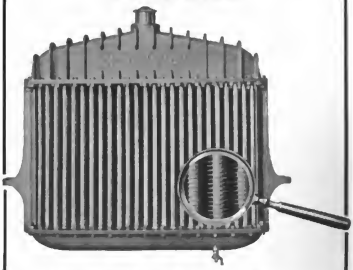

## "Whitney" Chains

are made by specialists in the foremost organization for chain design and manufacture in America. Our aim is dependability of service under hardest conditions, and our success in this is shown by the standardization of "Whitney" Chains by the leading motor truck makers of the country.

**The Whitney Mfg. Co., Hartford, Conn.**
Chains—Keys—Hand Milling Machines

## RADIATOR INSURANCE

The cooling section of this Rome Helical Tube Truck Radiator is guaranteed for the life of the truck.



Highest in Quality and Efficiency Highest in Price

*Write us for details*

**ROME-TURNEY RADIATOR COMPANY**
ROME, NEW YORK

## The United Line

DEALERS—
"Unite With The United"

| | |
|---|---|
| 2 ton Worm Drive Truck | $2250 |
| 3½ ton Worm Drive Truck | 2900 |
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Nothing Experimental—
Nothing Obsolete

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Stewart Carburetor
Ware Radiator

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Spicer Drive Shaft
**United Factors**
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Yale Locked Speed Governor

Perfection Springs
Timken Axles
Timken Bearings
Gemmer Steering Gear

**UNITED MOTOR TRUCK CO.** Grand Rapids Michigan

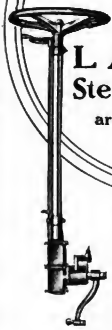
## Eliminate Doubt

**make assurance doubly sure**

There is a real reason why

**LAVINE Steering Gears**

are recognized as America's standard



More than any other part of the truck equipment, the steering gear needs to be reliable. Neglect in this respect may very easily lead to serious trouble. LAVINE Gears will set your mind at rest.

**The answer lies in the fact itself**

Four sizes—½-ton to 5 tons. Send for blue prints.

**LAVINE GEAR COMPANY**
Station A RACINE, WIS.

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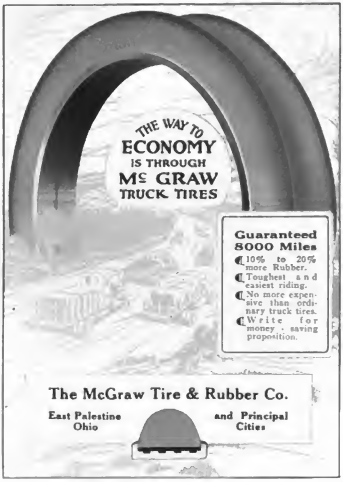
# Baker Electric Trucks

**The vitally interesting thing about a Baker Electric truck is its satisfactory service at low upkeep cost.**

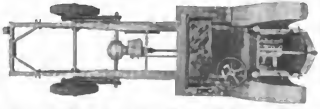
**It can do your work better at less cost. Convincing facts are yours for the asking.**

**The Baker, R. & L. Company, Cleveland, O.**

Manufacturers of Baker and Rauch & Lang pleasure cars and Baker trucks.



# SOUTH BEND



## Double Duty Trucks

—once put in service—always remain in service.

Whatever your business may be there is a SOUTH BEND DOUBLE DUTY TRUCK that will give you the utmost efficiency and satisfaction.

***Wisconsin motors, Warner transmission, Sheldon axles, Ross steering gear, Bosch ignition. Either chain or worm drive.***

SOUTH BEND DOUBLE DUTY FIRE APPARATUS in all cases more than performs its duty.

Attractive Dealer Proposition. Write us at once.

**South Bend Motor Car Works**
**SOUTH BEND, IND.**

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One of six Jeffery Quads in the service of the United States Army Signal Corps. This is the most powerful portable wireless station in the world. The Jeffery Quad drives, brakes and steers on all four wheels.

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Main Office and Works, Kenosha, Wisconsin

Honest Chauffeurs Like the
Veeder Hub Odometer
because it does not permit them to be suspected unjustly

This Veeder Hub Odometer registers distance traveled backward as well as forward; there is no way to disconnect it by slipping gears out of mesh. Price complete, $20. Special model for Ford Cars, $15.

Cyclometers for Bicycles and Motorcycles, Odometers for Automobiles and Horse Drawn Vehicles, Counters for practically every purpose. Tachometers, Tachodometers and Fine Die Castings.

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"Strongest Transmission Built"

—writes a user of Cotta "Short Series" Transmissions, and he adds: "And at the same time is more easily operated than any other selective type transmission."

Cotta "Short Series" Transmission

—is constructed for durability and reliability. Insures easiest engagement at any speed, under all conditions. Built strong and rigid. Best materials. Make it standard on your next truck.

COTTA GEAR CO.
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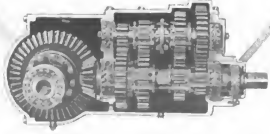




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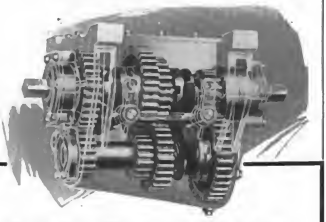
NEW YORK::CHICAGO::BOSTON::PHILADELPHIA

2813



## Cotta Transmission

Selective Type, Sliding Clutch for all commercial and pleasure vehicles.

Many years of experience in the manufacture of transmissions for motor vehicles have established COTTA supreme.

**All Gears Always in Mesh**
**No Plain Bearings**

Gears that at times run idle, mounted on roller bearings.

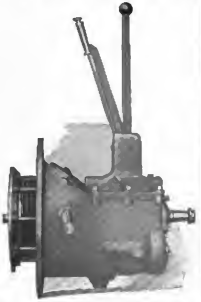
Specify COTTA in your next car, for service.

**COTTA TRANSMISSION COMPANY**
814-18 S. Main Street Rockford, Ill.

# FULLER
## Unit
## TRANSMISSIONS

Model
"T U"
¾-1 Ton

Model
"T U 2"
1½-2 Ton



*Particulars sent on request*

**FULLER & SONS MFG. CO.**
Kalamazoo, Mich.

# This Is The New Reo ¾-Ton Truck

A SPEED WAGON designed to fill a broad field and an urgent need.

ON PNEUMATIC TIRES—22 miles per hour.

**$1075**
**With Express Body**

**Reo Motor Truck Company**
Lansing, Mich.

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## The Wood Hydraulic Hoist

SOLVES THE DUMPING PROBLEM FOR MOTOR DUMP TRUCKS

"Made in Detroit Only" by the

**WOOD HYDRAULIC HOIST & BODY CO., Detroit, Mich.**

Successors to WOOD HYDRAULIC HOIST CO., St. Paul, Minn.



## EISEMANN

OF THE 93 manufacturers who use Eisemann magnetos in this country, 69 are truck makers.

If you are not one of the 69 Eisemann users you are not getting the greatest possible ignition efficiency.

**The Eisemann Magneto Co.**

Sales and General Offices

**32-33rd Street, Brooklyn, N. Y.**

New York, 245 West 55th Street
Indianapolis, Ind., 415-417 North Capitol Ave.
Detroit, Mich., 802 Woodward Ave.

## Quality and Character

It is essential to have the same high standard of quality and character in the commodities you build as it is to have it in the men who build and sell those commodities. Sanford trucks are built for quality and character by men who know how.

Model O

Model O
¾ Ton
$1350
Express

$1290
Chassis

Model M
4000 lbs.
$2000
Express

$1910
Chassis

Model M

Dealers are at liberty to send for Sales Plan and inquire for open territory.

**Sanford Motor Truck Company**

**Syracuse** **New York**



## Annular Ball Bearings Reground

ONE FIRM ONE SERVICE

ONE GUARANTEE

BACK OF

EVERY BEARING REGROUND

BY

**Ahlberg Bearing Company**

**2636 Michigan Avenue** **Chicago, Ill.**

1790 Broadway, New York
93 Massachusetts Ave., Boston
1841 Euclid Ave., Cleveland
805 Woodward Ave., Detroit
325 West Pico St., Los Angeles
2831 Locust St., St. Louis




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## Ross Steering and Differential Gears

**Will Help Sell Your Trucks**

They are
STANDARD
on good motor truck construction

**Investigate**

our new complete line of fore and aft steering gears.

Enormous bearing surfaces
Perfect lubrication
Best material throughout
Finest workmanship

Built in the largest and newest steering gear factory in the United States.

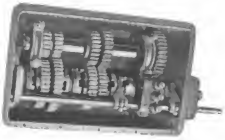
*Write for catalog*

ROSS GEAR & TOOL COMPANY
790 Heath Street Lafayette, Ind.

## ONE of the FOUR Reasons Why You Should Buy B. A. Gramm Trucks

**BECAUSE:**

The Transmission is Absolutely Fool Proof,
The Gears are Always in Mesh,
You Don't Have to Shift Them, and
Consequently Can't Strip Them.
Don't Take Our Word for It; We Are Here to Prove It.



**The Gramm-Bernstein Co.**
Lima, Ohio U. S. A.

**The best selling motor truck proposition in America**

## THE ¾-TON MODEL "S"

INDIANA

## MOTOR TRUCK

**Sold on Easy Time Payments**

Dealers will find in this new model a truck of especial interest to the merchant who appreciates motor truck efficiency and economy but who hesitates at large initial payments and up-keep costs.

Highest possible quality of workmanship and material—correct in design—honestly built—and unqualifiedly guaranteed.

Write for circular and particulars.

**The Harwood-Barley Mfg. Co.**
Marion, Indiana

CONSTANT·DEPENDABLE·SERVICE
PITTSBURGH MODEL ENGINE COMPANY
MODEL MOTORS
PITTSBURGH PA.

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# Celfor INTERNAL GEAR DRIVE Axles

**For Motor Trucks—Absolutely Quiet**

If you want a strong efficient unit drive that is specially designed for truck work, from one to three tons capacity, write us for complete information about the

## Celfor
## Internal Gear Drive Rear Axle

It possesses marked constructional advantages which commend it to thoughtful designers, engineers and truck makers. We shall be glad to go into these in detail on request.

**Write today for details, catalog and prices**

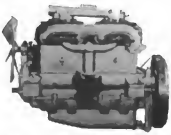
**Celfor Tool Company**

**Buchanan** **Michigan**

Brown-Lipe transmissions and differentials represent the maximum from a standpoint of efficiency and durability.

BROWN-LIPE GEAR Co
TRANSMISSIONS
SYRACUSE · · U.S.A.
NEW YORK CHICAGO DETROIT
Thos J Wright R Franklin Peterson L D Dalton
BROWN-LIPE-CHAPIN Co





# Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

**BEAVER MFG. COMPANY**

**Milwaukee** **Wisconsin**



BUILT IN AMERICA

***From European Design—With Careful British Shop Practice***

# Burford Trucks

**One- and one-half ton. Internal gear final drive.**

**The H. G. Burford Co.**

**FREMONT :: :: :: OHIO**

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Garford

Garford Trucks range from 1500 pounds to six tons in capacity.

They are designed and built by men who have spent their lives in the study of motor trucks.

They are backed by one of the strongest organizations in the industry.

Bodies are provided to meet all requirements.

*Write for catalog. Please address Dept. 103*

The Garford Motor Truck Co., Lima, O.

THIS TRADE MARK STANDS FOR

**QUALITY**

**MOTOR TRUCK SPRINGS CORRECTLY HEAT TREATED**

**THE CLEVELAND-CANTON SPRING CO.**
**CANTON, OHIO**




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# A TRUCK THAT PULLS THE LOAD

The above illustration shows a Duplex Four-Wheel Drive Two-Ton Truck performing an almost unbelievable feat. A flock of sheep which, together with the trailers, weighed over twenty tons, was hauled a distance of six miles over poor country roads. Due to the extremely rugged construction of the truck and its all-four-wheel traction, the run was accomplished without difficulty.

The Duplex is the peer of any truck built for strength and general efficiency. Made in two-ton and three-ton capacity. Fully covered by patents.

***We have an attractive dealers proposition. Get in touch with us immediately.***

**THE DUPLEX-POWER CAR COMPANY**

***Manufacturers of*** — **Four Wheel Drive Trucks**

**CHARLOTTE, MICH.**

## Extreme care in assembling

Buda Motors backs up extreme care in the making of every part. Every man who touches a Buda is a specialist in a certain process under orders to do nothing less than his best.

This is part of the reason for the long life, mileage and service Buda Motors give in thousands of pleasure cars and trucks.

Address BRANDENBURG & COMPANY, Facty. Reps.
8th & Broadway, N. Y. 1112 S. Michigan Ave., Chicago 1811 Dime Bank Bldg., Detroit

THE BUDA CO., HARVEY (CHICAGO SUBURB), ILL.




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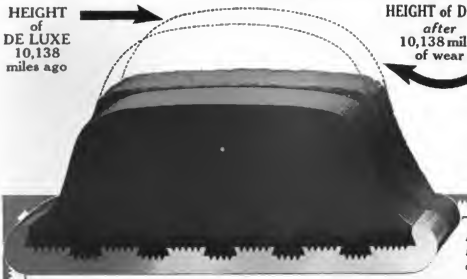
HEIGHT of DE LUXE 10,138 miles ago

HEIGHT of DE LUXE after 10,138 miles of wear



A full-sized regular tire left after 10,138 miles!

*Regular sized tires of different makes averaged only 7,000 miles in all!*

Thousands of miles still to be had after 10,138 Miles of Service! A typical example of DE LUXE MILEAGE on the big Pierce-Arrows operated by Spaulding & Spaulding of Buffalo.

Spaulding & Spaulding have tried all makes and all type of tires. They are now equipping their 17 trucks with DE LUXE tires—as rapidly as others wear out. DE LUXE tires are doubling their mileage.

What do your tires average? Why not take advantage of the experience of big truck operators, such as Spaulding & Spaulding, and get correspondingly increased mileage?

*Investigate now—write for "Upsetting Mileage Tradition"*

GOODRICH "DE LUXE" WIRELESS TRUCK TIRES

THE B. F. GOODRICH CO.

*Service Stations and Branches in All Principal Cities*

*World's Largest Rubber Factory Akron, Ohio*

The BESSEMER for Contractors

Contractors will find in this 3½-ton Bessemer, equipped with Wood Hydraulic Hoist, the logical truck for their hauling problems.

Only the best obtainable materials and workmanship are employed in the construction of Bessemer trucks.

Let us tell you why the Morgan Johnston Contracting Company of the capital city, who own two Bessemers, made it their choice.

The Bessemer line includes both chain and worm driven models. Send for descriptive literature

BESSEMER MOTOR TRUCK COMPANY, Grove City, Pa.



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## When Your Truck Loses a Day—What?

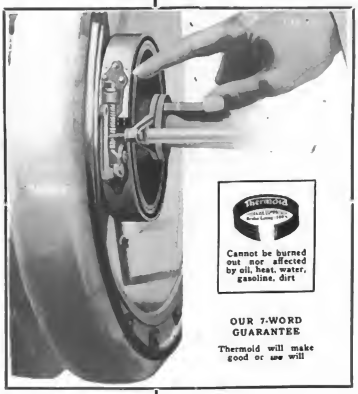
Loss of service, inconvenience, expense for repairs. Guard against accidents that cause a cash outlay by using

**Thermoid**
**HYDRAULIC COMPRESSED**
**Brake Lining-100%**

Though Thermoid may be worn down to the thickness of the paper on which this advertisement is printed, it is never friction shy. Thermoid is cured under hydraulic compression into a solid substance of uniform density. Thermoid is brake lining all the way through—surface to surface—and its use does away with doubt and uncertainty. It would do the same on your truck.

Insist on equipping the brake on that truck of yours with Thermoid, and don't feel safe, sure or satisfied until you know it is there.

**Thermoid Rubber Co.**
**Trenton, N. J.**



# Audel's Gas Engine Manual

This volume gives the most valuable information respecting the construction, care and management of **Gas, Gasoline and Oil Engines, Marine Motors and Automobile Engines**, including chapters on **Producer Gas Plants** and the **Alcohol Motor.**

The work is divided into 27 chapters. Each chapter is illustrated by diagrams which make it a thoroughly helpful volume, containing 512 pages, 156 drawings, printed in large, clear type on fine paper, handsomely bound in rich red cloth, with gold top and title, measuring 5½ x 8½ inches, and weighing over two pounds.

The book is a practical educator from cover to cover and is worth many times the price to any one using a gas engine of any type or size.

**Price - - - - $2.00 Postpaid**

**Book Department The Commercial Vehicle**
**231-241 West 39th Street, New York City**

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another **FEDERAL**

ENDORSEMENT

The Detroit Emery Wheel Company
DETROIT GRINDING WHEEL CO., Successors
Manufacturers of the Celebrated
HART GRINDING WHEEL AND GRINDING MACHINERY
Grinding Wheels made from all Abrasives, Natural and Artificial

DETROIT, MICH. June 21st, 1915

Refer to Mr. Martin L. Pulcher.

Adv. Dept.- Here's your real evidence. Use it! Pulcher

FEDERAL MOTOR TRUCK CO. RECEIVED JUN 21 1915 GENERAL OFFICES DETROIT, MICH.

Federal Motor Truck Co.,
Detroit, Mich.

My dear Mr. Pulcher:-

I enclose check for $15.13, in payment of your bill, and I thank you very much for your courtesy in making the repairs so promptly

This is the first time we have had done to the truck in 10,000 miles.

Yours truly,

DETROIT GRINDING WHEEL CO.
PRESIDENT

FFR/MD.
Encl.

FEDERALS ARE DEPENDABLE, ECONOMICAL, EFFICIENT BUSINESS BUILDERS.

REPAIRS $15.13
AFTER 10.000 MILES
— USEAGE —

WRITE FOR THE BLUE BOOK OF TRAFFIC

FEDERAL MOTOR TRUCK COMPANY

LARGEST MANUFACTURERS OF 1½ AND 3½ TON MOTOR TRUCKS EXCLUSIVELY

DETROIT - MICHIGAN - U.S.A.




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# FEDDERS RADIATORS

OUR facilities for accommodating the wide range of radiator sizes, shapes and other characteristics various truck chassis layouts call for, have been developed to a point where we can make deliveries of specially designed radiators almost as promptly as if radiators of standard design were used.

This is an advantage, for in every radiator we build—however special its design—Fedders Quality is there—unchanged and unimpaired. The only thing we insist upon, before building to other than our own design, is that the calculations governing size, etc., be correct.

Our co-operation with your designers will be found as advantageous as our ability in point of quality and delivery.

## Fedders Manufacturing Co.

INCORPORATED

Buffalo - - - - - - New York




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# Overland

TRADE MARK REG

## Delivery Cars

**$725** *f. o. b. Toledo* *Open Express Delivery Car*

## A Highly Profitable Trade Developer

**$750** *f. o. b. Toledo* *Panel Body Delivery Car*

COMPETITORS are daily convincing your customers of the promptness of motor delivery.

For today, more than ever before, continued patronage depends largely upon the maintenance of satisfactory delivery service.

Why not hold your own customers and obtain others from less progressive merchants. That is just what the Overland Delivery Car will help you do.

The price of this car is astonishingly low. Also, the cost of operation is proportionately small.

It is *cheaper than a horse and wagon to operate*—yet it does three times as much work.

The famous 35 horsepower Overland motor has power in excess of anything you will ever require. It is smooth running and always dependable.

The Overland Delivery Car is electrically lighted and started. Ignition is by high-tension magneto. The car has a revolving oil indicator, large tires and other advantages found on no other delivery car at this low price.

This substantial, highly efficient vehicle not only saves money for its owners—it *makes money* for them.

*Write today for a special delivery car catalog. Please address Dept. 101.*

**"Made in U. S. A."**

**The Willys-Overland Company, Toledo, Ohio**

**Also Manufacturers of the Overland and Willys-Knight pleasure cars**

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# The LARGEST MINE LOCOMOTIVE in the WORLD

# SKF
## Ball Bearings

**The Rigid Test Requirements of the World's Greatest Engineers**

**Have been fulfilled and exceeded by**
**S. K. F. Self Aligning Ball Bearings**

They are giving their best service in the heaviest duty electric, hydraulic and steam engineering practice in the world.

The automobile owner and manufacturer who demands perfection in type of bearing—who wants quality materials and perfect design and construction will find S. K. F. Self Aligning Ball Bearings to be "The Master" automobile bearing.

Swedish Steel and Swedish skill have been combined in this exceptional product which has gained the preference of the best European and American manufacturers because of sheer superiority of quality.

Our importations are normal and we can deliver promptly.

**SKF BALL BEARING CO.**
**50 Church Street New York, N. Y.**

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CHASE
THE WORM DRIVE LINE

# ECONOMY

Delivery cost cut to bed-rock—no guessing—no "think so"—but honestly cut to such an extent that it makes itself apparent every day of operation.

# Chase Motor Trucks

pay their way for manufacturer, contractor, retailer, or whoever enlist their use. Over 5,000 of these cars are now in constant service in every country in the world.

Built by one of America's pioneer truck manufacturers, they offer a service that is uniform, whether for long hauls or frequent stops.

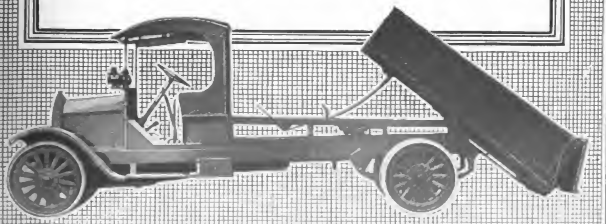
**Water Cooled Motor—Worm Drive—Extra Heavy Frame—Unit Power Plant**

A flexible line of models ranging in capacity from 1,000 lbs. to 7,000 lbs., $750 to $3,300.

***Write for new literature***

**Chase Motor Truck Co., 102 West St., Syracuse, N. Y.**

*"CHASE YOUR DELIVERY"*





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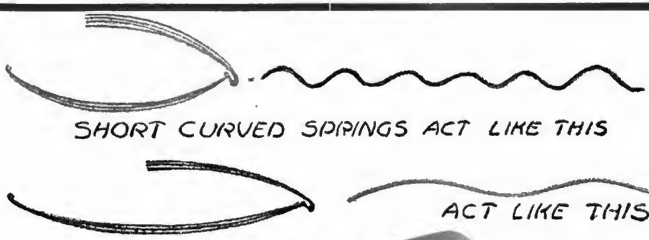

THE shocks from the road are absorbed by the springs, a brief interval elapsing before the springs act on the body of the car.

If the springs are short the shock is transmitted to the car almost instantly, resulting in a jolt. With a long flexible spring the interval is much more extended; the result is a long wave-like motion. For this reason

# DETROIT SPRINGS

RESILIENT Detroit Springs SILENT TRADE MARK -SELF-LUBRICATING

*Insure Riding Comfort and Protection to the Car*

**Look for the Lubricating Cups and Identify Detroit Springs Instantly**

These cups near the end of each leaf are filled with a long-lived lubricant that insures smooth action and prevents squeaking. The story of good spring making is interestingly told in the book "From the Ore to the Motor Car." Send for it and learn of the accuracy of Detroit Spring making.

**DETROIT STEEL PRODUCTS COMPANY**
**2260 East Grand Boulevard, Detroit, Mich.**

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# REPUBLIC MOTOR TRUCKS

## INTERNALLY GEAR DRIVEN

## With the Republic Line You Can Supply the Demand in Every Trade

*If you had the Republic agency sign over your door—if you had the complete line of Republics to back you up, you could sell trucks to every business*

THINK, MR. DEALER, WHAT THIS MEANS TO YOU!

There are over 250 businesses to appeal to with the Republic line.

—And due to its correctness of design, its great mechanical stability, and its wonderfully *low first cost* and after *operating economy,* the Republic has reached the very apex of success.

Republic dealers are sharing these profits with us.

"THE COMPLETE LINE"

¾-Ton, with Express body; **$ 995**
1-Ton, with Express body, **$1275**
2-Ton, Chassis only, - - **$1575**
3-Ton, Chassis only, - - **$2250**

If there is not already a Republic dealer in your city, it will pay you to write us about it.

*Literature on Request*

**Republic Motor Truck Co., Alma, Mich.**

*The Largest Exclusive Truck Manufacturers in the World*

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# SIGNAL

## Worm-Drive Trucks

## For the Manufacturer

There is a type and capacity Signal truck for practically every haulage requirement.

Signal trucks are simple in design and construction and in operation. Silent in use, efficient, and made for long and constant service.

Best of all, Signal Trucks cost less to operate than you are aware and if interested let us refer you to SIGNAL OWNERS in your line of business—they know.

| | |
|---|---|
| 1 Ton Chassis—Worm Drive | $1500 |
| 1½ Ton Chassis—Worm Drive | $1700 |
| 2 Ton Chassis—Worm Drive | $2000 |
| 3½ Ton Chassis—Worm Drive | $3000 |

**SIGNAL MOTOR TRUCK COMPANY**
**Detroit, Michigan, U. S. A.**

**Two-ton SIGNAL**
**Used by one of the large can manufacturers**

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# TROY MOTOR-TRUCK TRAILERS

Double or triple the pay load.
Add practically nothing to tire and fuel expense.
Reduce equipment investment per ton of capacity.
Utilize draw bar pull otherwise wasted.
Make truck hauling practical by making it cheap.
Pull trucks out of the expense hole.
Facilitate loading and unloading.
Remove the limitations of the lonely truck.

## MAKE TRUCKS PAY

Perhaps your truck doesn't pay. Perhaps you're disappointed with the whole truck idea. Or maybe your trucks don't reduce costs much below team hauling, if any. Or your present truck equipment is inadequate. Or you are still looking for higher hauling efficiency.

On any of these reasons you ought to investigate Troy Trailers. We will help. Troy Trailers are built in 1½, 2½ and 5-ton models. Can be furnished with Dump or Platform bodies. Tell us about your conditions and we will report on the possibilities for making your hauling cost less with Troy Trailers. Ask for Catalog 4CV.

**The Troy Wagon Works Company**
**TROY, Miami Co., OHIO**

New York 50 Church St. | Detroit 113 First St. | Washington, D. C. 505 Riggs Bldg. | Chicago 900 Lytton Bldg. | St. Paul 331 Amer. Nat'l Bank Bldg.




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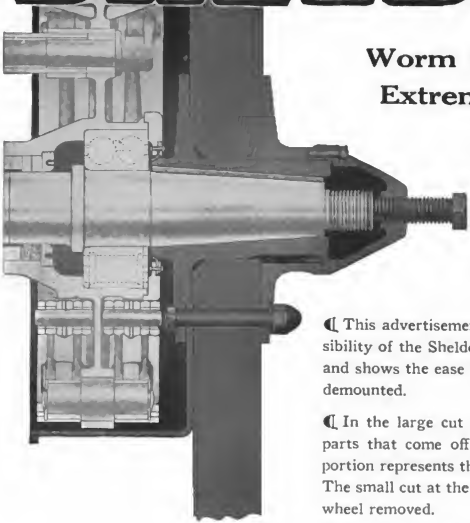
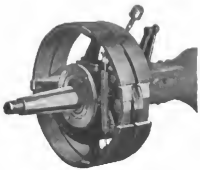
# SHELDON



## Worm Gear Axles Are Extremely Accessible

¶ This advertisement illustrates the extreme accessibility of the Sheldon semi-floating worm gear axle and shows the ease with which either wheel may be demounted.

¶ In the large cut the dark portion represents the parts that come off in demounting while the light portion represents the parts that remain on the axle. The small cut at the bottom shows the axle end with wheel removed.



¶ To demount a Sheldon wheel, remove hub cap, take off wheel retaining nut, replace hub cap and insert wheel removing stud as shown in illustration. A few turns of this wheel removing stud and the demounting is completed.

¶ Note that, when wheel has been removed, the bearings remain undisturbed and protected in their housing upon the axle shaft.

## The Sheldon Axle and Spring Company

Makers of Springs and Axles for Heavy Duty Service for More Than 50 Years

**Wilkes-Barre** Chicago: 122 S. Michigan Blvd. Detroit: 1215 Woodward Ave. San Francisco: 444 Market St. **Pennsylvania**

**"Exhibiting Section 16, Transportation Bldg., Panama-Pacific Exposition, San Francisco."**



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COVERT

TRANSMISSIONS

The name COVERT is an assurance of service and satisfaction. It stands for quality. It represents efficiency. It signifies simplicity of construction. It assures durability. It indicates the greatest transmission value. It means economy in assembling and of operation. It's the name that will help sell your product.

We make transmissions for all types of pleasure cars and trucks. Consult our engineers concerning your requirements.

COVERT MOTOR VEHICLE COMPANY
FACTORY, LOCKPORT, N.Y. SALES OFFICE, DETROIT, MICH.



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"The Spring Is the Thing"

MATHER

Scientifically Heat-Treated

SPRINGS

designed to insure

Maximum of Elasticity and Endurance

with

Minimum of Vibration

Genuine made only by

The Mather Spring Company

Toledo, Ohio



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# HESS-BRIGHT

IN worm gear construction ball bearings are particularly adaptable for the mounting of the worm shaft.

¶ Below is shown one method of mounting in which two radial bearings, one at either side, are used in combination with a regular thrust bearing.

¶ Great care must be taken in mounting worm gears to provide ample thrust capacity that will not wedge; for under conditions commonly encountered, this thrust load along the worm shaft is more than six tons.

¶ Not only does this Hess-Bright method of mounting provide ample capacity with no danger of wedging under load—but it is a simple and practical machining proposition that should appeal to every manufacturer.

## The Hess-Bright Mfg. Co.

**Philadelphia, Pa.**

HESS-BRIGHT BALL BEARINGS ARE PATENTED




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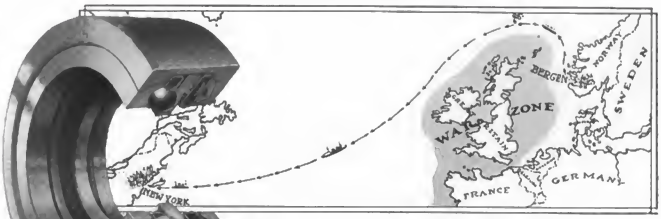


S K F Double Thrust

# Steamers Plying Outside War Zone Give Prompt Deliveries From Sweden

THE path of transatlantic commerce between Sweden and the United States lies outside of the War Zone. The activities of war have not disturbed the shipments which come regularly from Sweden.

American manufacturers are quick to appreciate prompt deliveries, and the fact that S. K. F. Ball Bearings are imported direct from Sweden, give to you all the skill and fine Swedish steel that goes to make up S. K. F. Ball Bearings.

We are now receiving heavier stock shipments than ever before. And just as the supply of S.K.F. Ball Bearings has increased, so has the demand for them grown. Manufacturers are specifying S. K. F. on their equipment because of exclusive merit found only in S. K. F., "The Master Bearing." Send us your specifications.

SKF
BALL BEARINGS

**SKF BALL BEARING CO.**
50 CHURCH STREET
NEW YORK CITY

S K F Radial

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The COMMERCIAL VEHICLE

Published on the First and 15th of Each Month

THE COMMERCIAL VEHICLE, Incorporated
at 231-241 West 39th Street, New York

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The COMMERCIAL VEHICLE
Read by Business Men

Vol. XIII September 15, 1915 No. 4

# Rapid Delivery Service by Trucks Keeps Anco Trade

## Intensive Transportation Scheme Most Important Part of Business Equipment of Big Brooklyn Grocers

By Merrill C. Horine

COMPETITION, in the wholesale grocery field, is service. A disappointed housewife is likely to transfer her account, therefore the retail grocer hies himself to get the order there on time. If the wholesale house fails to get the goods to him in time to fill the housewife's order as per schedule, that grocer, knowing full well what the result may be, is quite likely to transfer his account in turn to some other wholesaler who not only promises but performs good service.

Service competition centers mainly about final delivery, but the manner in which the stock is assembled, moved through the various warerooms, and finally loaded into the vehicles determines to a great extent the service which the trucks can give.

### A System for Service

With this thought in mind, Austin, Nichols & Co. have developed an elaborate transportation system in their new Brooklyn, N. Y., plant, every feature of which is designed to give the best possible delivery service to customers—a system which enables them to guarantee delivery of all orders received before 3:00 p. m. the same day within the delivery area.

Austin, Nichols & Co. are importers and manufacturers of fancy groceries and wholesale dealers. They own the Sunbeam brand of high-grade food products, they roast coffee, import and pack olives, grind spice, and import delicacies and table luxuries. They are said to be the largest olive packers in the world.

Although New York is the home office, stocks are carried in Cleveland, O., Minneapolis, Minn., Cincinnati, O., Savannah, Ga., Jacksonville, Fla., St. Louis, Mo., Louisville, Ky., Kansas City, Mo., Memphis, Tenn., New Orleans, La., and Charleston, S. C., and foreign offices in London, Paris and Seville. While specializing on the better class of trade, they serve every class of grocery dealer.

Of the total business, 60 per cent is forwarded by freight and 40 per cent goes

South wall of Austin, Nichols & Co.'s Brooklyn plant, showing receiving and shipping doors with substantial concrete awning

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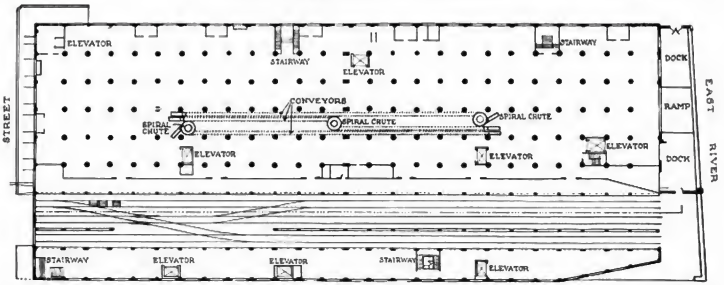


Main floor plan of Austin-Nichols plant, showing dock on river front, railroad tracks within building with bulkhead for car floats, location of seven elevators, three spiral gravity chutes and caterpillar conveyors. The loading doors are on the south wall of the building at the top of the drawing

to New York City and the immediately-surrounding suburbs. Of the latter, 25 per cent is delivered by horse vehicles and 15 per cent by motor trucks. Of the horse vehicle deliveries, however, the greater portion is to the ocean liners, and to large hotels, so that practically all of the remaining grocery store and restaurant trade is served by the motor trucks.

### Getting Away from Congestion

Early in February of this year the Austin, Nichols company opened its new plant in the Greenpoint section of Brooklyn, N. Y., and at about the same time its Harlem branch on upper Manhattan. Previous to this time it had carried on its business in the wholesale grocery district on lower Manhattan, on Hudson street.

In the old section, not only were rentals high, but congestion was great and the cost of getting the goods from the various railway terminals was excessive. This, because the warehouses were located inland and on narrow, crowded thoroughfares. All incoming goods, not delivered in the wagons of local concerns had to be hauled from the various freight terminals in New Jersey and on Manhattan, which method besides being expensive was slow and caused great congestion at the necessarily small receiving platforms.

The new plant is located on the East river, and runs through several blocks to Kent avenue. Nearly all of the incoming goods is transported by water, local concerns delivering not only in their own vehicles by land, as before, but also by river lighters.

The building is of reinforced concrete and steel, measuring 200 by 500 feet. It fronts on three streets and the East river. Besides being fireproof, it is equipped with an automatic sprinkler system throughout. It is six stories high with basement. The first floor is devoted to receiving and shipping, the second to packing and distributing orders, the third, fourth and fifth floors to factory and warerooms, and the sixth to the general offices of the company.

Water transportation is provided by the car floats of the various railroads and by the company's own lighters. A long dock on the water end of the building permits two car floats to moor at once, and the cars may be switched directly into and along the side platforms of the building.

Two sidings run into the building on the main floor, the tracks being so depressed that the car floors are level with the cement platforms, flush with the main floor. One siding, having one track is at the north side of the building and is used for incoming carload shipments; two others run a little to the north of the center of the building and serve for outbound and carload shipments.

Lighter shipment and receipt is made over the bulkhead at the waterfront, a ramp connecting the lower grade of the pier with that of the main floor.

Receiving department, showing truckers taking bags of sugar off trucks at the door, loading them on handtrucks, weighing them on automatic scales, and elevator which takes them to the store rooms above

### 500 Feet of Loading Space

The team and truck doors occupy the entire south length of the building, which is 500 feet long.

From the order book to the customer's door, the Anco system is worked out for the utmost speed of shipment. Delay is cut out at every turn, and each order is handled as though it were a special delivery order. This is what is called service in the grocery trade and it is the biggest thing in competition, aside from prices and quality of goods, which are very well standardized.

Communication between the main office and plant of the concern and the principal branch at 100 Hudson street, New York City, and the Harlem branch at One Hundred twenty-ninth street and the Harlem river, Manhattan, is by telephone, telegraph and telautograph. The latter apparatus consists of an automatic

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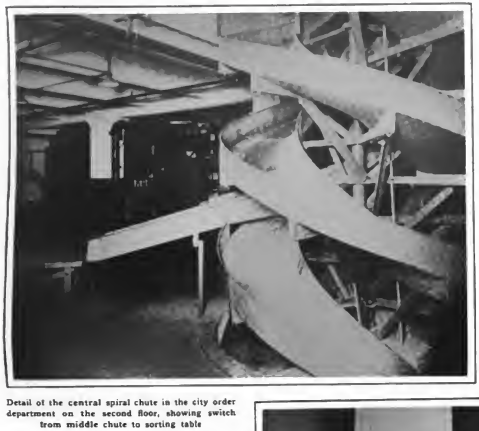

Detail of the central spiral chute in the city order department on the second floor, showing switch from middle chute to sorting table

writing machine, actuated by telegraph by which an order written with the sending instrument at an initial point will be duplicated in the writer's own hand by the receiving machine, miles away, instantaneously. It has the advantage over the telephone of putting the message down in black and white in the handwriting of the sender, so that mistakes are unlikely, and the advantage of speed over the telegraph.

### No Delays in Transmission

At the plant the orders from the office are sent to the various departments by pneumatic tubes, so that from the time an order is received, say at the Hudson street office, until the stock clerks begin making up the order in one of the warerooms of the plant several miles away need only be an interval of a few minutes.

Merchandise, when drawn from stock, is rapidly transported to the various sections of the shipping department by spiral gravity chutes and conveyor belts, these taking small orders directly from the wareroom on any of the floors to one of the three shipping divisions on the main floor without touching a human hand and without delay of any kind.

From the shipping room the orders are loaded directly into one of four classes of delivery carriers. The first of these are the motor trucks of the concern, the second are the horse wagons, the third the Anco lighters, and the fourth the railroad cars spotted in the building.

Horse wagons are used for the short hauls, motor trucks for the medium to long city hauls, the lighters for transfer or relay of goods to the Harlem branch and the freight cars for long-distance shipments.

### The Delivery System

The delivery transportation system, then, divides itself into five separate units:

The first of these is the interior system of elevators, gravity chutes, conveyor belts, and floor trucks.

There are eight elevators distributed throughout the building, three of which are used to carry incoming and outgoing shipments at the bulkhead, two serve the railroad tracks and three more are distributed through the rest of the plant. One elevator is used exclusively for incoming goods from the receiving team platform, thus preventing delay incident to its use for downward movements as well.

Only heavy orders which can be loaded on large flat handtrucks are sent down on the elevators, all small orders going down in the gravity chutes, thus avoiding congestion of the elevators, delay in

Bottom of the central spiral chute, showing end of belt from back chute, sorters receiving the boxes and one of the electric industrial trucks in use. The congestion shown is abnormal, due to suspension of activity during the taking of the photograph

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The city shipping room, showing operation of loading a city electric truck. The electric industrial truck, here shown, runs into the truck to unload. Note type of door, easily opened and closed in cold weather

transmission and much hand trucking over the floor.

Three spiral gravity chutes are placed in the center of the building, one at the east, one at the middle and one at the west, about evenly spaced. They are triple-decked, the three decks being lettered A, B and C, respectively.

### Saving Human Labor

Goods deposited in the A chute at any of the three shafts will be deposited at the foot of the westernmost shaft, nearest the bulkhead or dock. Goods deposited in B chute is deposited at the foot of the middle shaft and that put in C chute, at the bottom of the easternmost shaft, toward the street front.

This feature is of inestimable value, as it eliminates trucking from one end of the building to the other, a necessity if the chutes were single. The movement from, say the C chute at the base of the westernmost shaft to the base of the most eastern of the three shafts is effected automatically by belt conveyors which run along the ceiling of the first floor.

Section B, at the base of the middle shaft is used for shipments by railroad.

Section A, at the base of the eastern shaft is used for city shipments by horse wagons.

Section C, at the base of the west chute is used for shipments by lighter to the Harlem branch and by motor truck for long-haul city delivery.

From the bases of the shafts the goods is transported to the various loading doors, cars, or to the lighter by floor trucks. These are mostly handtrucks, but two Elwell-Parker electric industrial trucks of the freight car type are also used for the loading and unloading of the lighter and as tractors for trains of from five to six handtrucks.

The battery vehicles are necessary for loading and unloading the lighters because of the grade. Heavy loads are less expensive to handle by electric than by hand power. As tractors, the electric industrial trucks do the work with one man, of more than a dozen men, as no truckers are needed, and the greater speed of the electric accomplishes twice the work of twelve long handtrucks.

On rush orders the electric trucks are often used as a supplement to the handtrucks, owing to their greater speed and agile maneuvering ability.

### Theory Gives Way to Practice

The ideal of having all down movements conducted by gravity, using the elevators only for upward movements, is carried out as far as is practicable, but frequently when the orders are very large from any one department they are assembled on large flat handtrucks and sent down on the elevators. Five handlings are necessary from stock pile to tailboard by the conveyor method as against but two by the handtruck method.

Two types of handtrucks are employed, large ones with flat platforms for heavy bulk orders and receiving work and small roller-boxes for the transfer of goods from the stock piles to the heads of the gravity chutes. The handtrucks are all numbered and lettered with the name of the department or section to which they belong, and each must be returned to its proper department when its mission has been served, so that handtruck famines are unknown.

The lighters are loaded by swinging the handtrucks bodily overside by means of the lighters' booms, so that no retarding movements over gangplanks and decks are necessary.

Handtrucks and the electrics run directly into the railroad cars with their loads, and the cars are moved daily by the railroads.

Small orders for city delivery are assembled on the second floor into customers' bins, the goods coming from the upper floors on the middle B chute. Ordinarily this chute would deposit the goods at the base of the middle shaft, in the railroad delivery section, but an ingenious switch on the second floor di-

One of the Anco 5-ton Macks, taking a load from the city shipping room

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verts it onto a table in the city assembling room on the second floor. This switch consists of a fender which closes the chute below a certain point and opens its side so that the packages shoot off at a tangent, as shown in the illustration at the top of page 7. It is interconnected with an electric switch which lights a red light at the B chute on all floors, at the middle shaft. When this red light burns the stock clerks desiring to send down freight shipments use one or the other of the end chutes. It is in use most of the time, for freight shipments are not in such a hurry as city deliveries, and only when the city delivery gang is not at work is the switch closed.

When assembled, the city deliveries are sent either to the A section for motor truck delivery or to the C section for horse wagon delivery, according to the destination.

### Ten Trucks Oust Sixty Horses

The city delivery fleet consists of six G. V. electrics, one of 2-ton capacity, three 4-tonners and two carrying 5 tons and four Mack gasoline 5-tonners, in the motor division and forty-two horse wagons with ninety horses.

Before the move to Brooklyn there were 150 horses to be fed. More intensive methods made possible by a modern building specially adapted and equipped for the purpose, have thus saved sixty horses. The lighters which serve the Harlem river branch are a big help, of course; but the fact that car floats bring carload shipments from the west directly into the building has nothing to do with it, as all incoming freight hauling formerly necessary was performed by transfer companies as a separate matter from the delivery end of the business.

The decision of the Anco company to garage its trucks and stable its horses with a large concern operating its own equipment was probably wise. To have installed proper equipment and to have employed competent skill in a garage of small size would have been more expensive than to pay outsiders for responsible service at fixed prices. To have attempted private maintenance with anything less than such would have been to court disaster.

The first Austin-Nichols truck was bought 10 years ago and the concern has never been without trucks since. The original vehicles, however, have been disposed of and more modern equipment purchased since that time, the oldest truck in service being a G. V. 4 years old.

City delivery is divided into four zones, the first embracing the congested district within 2 miles of the plant and including the steamship piers. The second zone embraces all of Manhattan Island below Forty-second street, Jersey City, Hoboken, Weehawken, and Bayonne.

### Electrics Invade Horse Zones

Both of these are served by horse wagons. They are distinct in that in the first zone nothing but horse wagons are employed, while in the second the horse wagons are only used for small orders which must be moved from store to store, hotel and restaurant orders being delivered by electric trucks. The provisioning of steamships is done by horse wagons because of the excessive congestion along the waterfront on Manhattan and in Hoboken.

The third zone ranges from 2 to 5 miles in radius and includes all of upper Manhattan, Brooklyn, and Long Island City. The Bronx and all other points beyond 5 miles from the plant are served by the gasoline vehicles.

The outermost points served by the gasoline trucks are Freeport, L. I., New Rochelle, up Long Island Sound and Yonkers along the Hudson.

Staten Island is served by an independent suburban express line which delivers the goods cheaper than the company can. This express line carries the products of the linoleum factories on Staten Island into the city and is glad of a return load which will pay the cost of the return run. Any other arrangement would entail the expense of a long empty run back to town.

No attempt at direct delivery is made in New Jersey beyond the big bluffs back of Jersey City. Newark, Elizabeth, the Oranges, etc., are served by freight.

### Lighter for Long-haul Relay

Deliveries to the northern points, such as Yonkers, New Rochelle, Pelham, Mount Vernon and the Bronx are not made directly from the plant but by a relay system in which the steam lighter acts as the transfer vehicle.

It only takes a short while for this steamer to make the trip to the Harlem branch, where special orders may be transferred immediately to the waiting motor trucks. A limited but representative stock is kept at the branch so that most orders may be made up at once.

This saves the long and profitless runs between the two, on crowded thoroughfares which the trucks would be obliged to make were it not for the marine service.

Outside of the third zone every vehicle is a special delivery vehicle, for orders which are not in a hurry are sent by freight, as are all orders beyond the fourth zone. This is the practice of all of the New York grocery wholesalers and for the present, at least, is quite satisfactory to the retailers.

Every vehicle is expected to make two trips per day. The two-horse wagons carry 5 tons per trip, and so make the same daily tonnage as the gasoline trucks, but their mileage is much less.

Asked if such service as is now rendered by his company could be given without motor equipment, L. C. Owens, who occupies the position of director in charge of operations, replied that in the first three zones something like present Anco service could be approximated with horses alone, probably at greater cost, but that beyond the immediate confines of Metropolitan New York nothing could take the places of the motor vehicles. The electrics, Mr. Owens states, gives uniformly better service than the horse vehicles.

## NEW BOOKS

**"The Motor Car,"** by Duncan McMillan, A. M. I. Mech. E., is a new work on the principles of construction and practice in motor vehicle construction, designed for the information of the user of a motor car. Although treating the passenger type only, this book will be found useful to the commercial vehicle owner through its concise treatment of the principles of the internal combustion prime-mover; its various accessories, such as ignition apparatus, carbureters, etc.; the clutch; the change-gear; the live axle, etc.

These components are alike in principle in both classes of vehicle, and the book being designed for the rudimentary education of the motor user, much of the detail of current practice by different makers found in other more lengthy treatises is omitted.

That is the fundamental merit of the book—that it is concerned mainly with the simplification of the elements of gasoline vehicle design rather than with its history, development or refinement, with which the novice has little concern.

It is based on English practice, mainly, but is sufficiently broad to include the more noteworthy departures in design practiced in Continental Europe and our own country.

Horsepower, its nature, its reason for existence as a unit of measure, its determination, and the requirements in horsepower of the road vehicle is the subject well chosen as a beginning, for upon this commodity, its methods of production and transmission depend all the other characteristics of the modern self-propelled vehicle. Following, the arrangement of the chassis and its component parts are made clear with relation to the reasons for such arbitrary disposition and the logic of its variations. The engine is next covered, then carbureters, battery and magneto ignition, clutches, gearsets, differentials, bearings and brakes and steering and control parts.

Having digested these rudiments, the reader is next given a post-graduate course in the care of the vehicle and its tires and an advanced discussion of the merits of the two-stroke engine and various types of non-poppet valves.

"The Motor Car" is published by Longmans, Green & Co., London and New York, in an octavo edition, cloth-bound, 7¾ by 5 inches, containing 157 pages of text and 136 half-tone and line engravings. It is printed on a firm paper of even texture and bound in red. It is the ninth of Longman's Technical Series and is priced at 90 cents net.

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## Problems of Prosperity

BETTER TIMES in the truck trade are coming—are nearly here. In spite of the 15,000 trucks already shipped abroad, American makers are as busy as ever. Unfilled orders continue to pile up as they never piled before. But——how much of this prosperity is based in the domestic demand?

The material markets are easing up. Parts makers are better able to fill orders now than a few months ago and truck builders are laying in stocks again. They are running to capacity and building operations in truckdom continue. How much of this activity is being directed along domestic channels?

The foreign demand will not cease suddenly. Many of the orders now placed and as yet only partially filled are for long periods, whether the war continues or stops. The commercial demand in Europe is increasing and is beginning to measure up to the war demand in increasing proportion. America has a permanent foothold in the European truck market. European makers are genuinely worried. The colonial and Latin-American market has hardly been broached. All this in addition to an increasing domestic demand.

The jump from 784 to 13,996 trucks exported in 1 year, the doubling and trebling of important outputs together with great activity in mechanical improvement has not been accomplished without great effort. Supreme confidence in the capabilities of the motor truck and wonderful resource on the part of the American truck industry have been shown, but in some instances confusion has resulted.

One manufacturer, among the largest and most prominent in the industry, owing to the rushing of foreign in addition to domestic orders, and to the disorganization attendant upon the vacation season, finds that his sales files are incomplete. A great many more domestic sales have been made than are recorded in any way. He finds photographs of trucks in his possession which have recently been delivered to domestic buyers, regarding which he has no information. He does not know what industries are buying trucks most actively at present. He lacks knowledge of the activity of the market in different sections of the country, and as to which capacities are most required in individual lines of work.

Another concern, making light delivery vehicles on light passenger car chassis, keeps no record of sales whatever. The vehicles are sold to agents, not through them, and while the total number of chassis of both types over a period of time is known, to whom they were sold, why they were bought, when they sold most actively, or where the greatest demand exists, remain mysteries.

Another maker keeps a record of some of the sales, being careful to note the names of buyers, their addresses and the line of business in which they are engaged, but fails to note the number or capacities of chassis sold each.

The above concerns are all among the better-known producers. Among the more obscure makers one would naturally expect to find a still more chaotic state, and indeed one does in most instances; but one of the most impressive developments of the war year has been the progress of several heretofore minor concerns into or near the front rank. The most notable of these are not necessarily those who have built chassis for European belligerents.

In many cases their growth has been the result of the improvement of the opportunities here at home which some of the elect among commercial vehicle builders have overlooked in the excitement of big buys abroad.

One of these companies has as complete a system for keeping track of sales as can be found anywhere. Not only can the sales manager of this firm tell at a glance how many trucks have been sold in a given period, where they have gone, in what business they have been used, what capacity was purchased, and by whom sold; but he can learn also where the sale originated, what first brought the buyer and the salesman together, what other makes were competed with, and how much factory assistance in the way of correspondence, literature, etc., was supplied.

He can find what prospects are being followed up in each territory. He can also find the complete history of every chassis ever built by the concern, down to date, and he may spread the results of the work of any single dealer before him, corrected from the date of his first connection to the date of his last monthly report.

Still another of these also-rans of the trade keeps his representatives constantly supplied with names of prospects, with suggestions as to the most promising lines in which trucks may be placed in each different season, and exacts lists of prospects, as well as buyers from the agents.

These lines of endeavor are what differentiate as between leaders and followers. The bell-wether of the flock picks the way where the greenest grass grows; the rest of the sheep follow in his footsteps blindly. A bell does not make a bell-wether.

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# He Cuts Idle Truck Time

AMONG THE PIONEERS in the use of motor trucks for hauling contractors' building material, such as sand, crushed stone, cement and lime, James M. Ames, of the Ames Transfer Co., New York City, was foresighted enough to realize as far back as 1909 the great savings which could be made with motor equipment provided it was given a small amount of common-sense treatment. A motor truck is essentially a piece of machinery. It needs common-sense inspection and care. This is especially so when it is engaged in contracting work or hauling contractors' goods.

No one would think of expecting one of the large triple-expansion steam engines of one of our modern dreadnaughts to stand up year after year without constant care. It would seem that a motor truck in contracting work would need much more care than a battleship engine mounted on its substantial bed-frame because of the poor road conditions, and the abuses to which trucks in the former line of work have to be subjected in the race against time and profits.

Ames' maxims for truck satisfaction are: 1—Get a good truck; 2—Give it good care.

But of what does good care consist? Ames says that if you give your truck as much care as you would your mule there will be no kick coming. And he ought to know, for he had 100 head of mules before he purchased his first motor truck. Now he has twenty trucks and but four mules that are used for small puttering jobs around his company's yards.

A mule, while a better puller than a horse and able to work for longer periods at a stretch, is at times an ornery beast, especially in the winter months, if he is not given work day after day. Ames often found stalls kicked down in the morning when their occupants had not had work the day before.

Motor trucks do not act like mules when they have not worked the day before. They do not raise up on their front wheels and demolish the adjacent parts of the building, but they do need daily attention—attention to the minutest part, with none overlooked or skipped.

Ames has not given his trucks many chances to stand idle. If he has no work for them himself, he rents them out to others. He always finds a ready market for them. But way does he always find a ready market?

Because he has given them the best care possible, and for this reason they are always ready for work. In hauling contractors' material the element of time is all important. The profits of many a job have vanished into thin air because it was not completed in the estimated time due to delays in getting the material on the spot to do the work. A broken-down motor truck is nowhere such an abomination as in the hauling of contractors' material, because here time is the all essential.

Ames keeps his trucks in A-1 shape by making one man, his garage superintendent, responsible for their being ready for work at all times. The truck drivers are supposed to do nothing but drive and make minor adjustments. This concentrates the responsibility for the trucks' upkeep on the shoulders of one man instead of twenty. He is an expert mechanician. He knows every part of the truck from A to Z and how to repair it if it becomes damaged or broken.

Of course, he is aided in the truck maintenance by the drivers, who turn in reports after each day's work, noting what trouble, if any, has been experienced; the condition of the brakes, the clutch and the behaviour of the motor.

It was at the motor truck show held in Gotham in the winter of 1909 that he first saw a motor truck that looked good to him. This was a worm-driven Pierce-Arrow which caught his attention because the driving members were all inclosed and were therefore not open to lime and cement dust, sand and stone chips. He liked it so well that he bought it on the spot. It was delivered in July, 1910, and was the second truck of this make to be put into operation in New York City.

He put it through a year's severe test. He gave it very good care. No detail was too small. With this good care it proved so successful that he has bought nineteen more of the same make and size and all but four of his mules have been disposed of.

The company now deals in contractors' materials, such as lime, cement, etc., and also contracts to haul excavated material, either rock or earth, from building sites. The latter class of work is really a branch of the former and was entered because of the good performance of the trucks in the stevedore work and the great saving made as compared with mule haulage.

During the past spring, Ames' company contracted to haul the excavated material from one section of the new Brooklyn subway system to a dock on the lower East river. Six of the company's twenty trucks were purchased at one time to handle this work.

Ames took personal charge of this job to act as a buffer between his company and that doing the actual excavating. Time is an all-important element in this job. The trucks work 16 out of 24 hours, 6 days a week. They start at 6:30 a. m., working continuously until 2:30 p. m., and start again at 3 p. m. and run without a stop until 11 p. m., when they return to a special garage hired near the job. The trucks are 5-tonners and each covers an average of 135 miles per day. This job will take 6 months or more. The trucks have

(Continued on page 21)

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# Bay State May Boost Truck Fees

## Boston Users and Trade Fear Drastic Tax Increase

BOSTON, MASS., September 6—That the makers and dealers in motor trucks will have another fight on their hands when the Massachusetts legislature meets next January was made apparent here a few days ago when the special commission that is considering tax matters had one of its sessions. This commission was appointed to devise ways and means to increase the revenue for the state, so it took up the problem of motor vehicles.

Frederick T. Fuller, a member of the commission, said that motor vehicles should pay more, and he had Frank D. Kemp of the Highway Commission there tell what was needed.

Mr. Kemp told the commission that he favored a tax of $1 per horsepower on motor trucks. Then he went on to give testimony to the damage done to the highways by these vehicles. He said that the two other members of the commission felt the same way. At present the trucks are taxed according to tonnage. The commission will recommend undoubtedly an increase on all motor vehicles, and with the highway commission sending in a report, as it does every January, recommending more taxes the motor truck owners, makers and dealers will again have to battle the problem. So the time to get busy is now, before the campaign starts.

### EMPIRE STATE BUILDS 863 MILES OF NEW ROADS IN 1914

NEW YORK CITY, September 7—New York state now stands first in highway construction, according to the report of John N. Carlisle, former State Highway Commissioner, in which it is shown that 863 miles of roadways were completed and accepted and that 1,148 miles were contracted for during 1914, of which a large amount is now open to traffic. Nearly 94 miles of concrete roads and more than 81 miles of brick roads were built last year. Just half of the total of 863 miles improved were of bituminous construction and 258 of water-bound macadam.

Fully half of the whole system of nearly 12,000 miles of state and county highways laid out for improvement under the $100,000,000 bond issues has been completed. If extended in a single line, the finished roads would reach from New York City to San Francisco.

### WANT ROADS OILED SANELY

KANSAS CITY, MO., September 9—The many accidents due to oiled roads has caused more agitation in behalf of the plan of oiling half a road at a time. Within the city this practice is pursued, on the boulevards; but in the county the entire width of the roads is oiled at the same time. Motorists and engineers are longing for a system of oiling that will rapidly identify the oil with the road material and obviate the dangerous surfaces.

### GOLDEN RULE TRAFFIC BOOKLET

CHICAGO, September 3—Called the Golden Rule Traffic Booklet by the superintendent of the Chicago Police Department, a small folder entitled "Some Traffic Suggestions," published by the Chicago Section of the Electric Vehicle Assn. of America, earned its appelation because it admonished motor vehicle drivers to show a little more consideration for the other fellow. It also pointed out that it seemed to be the disposition of drivers of electric vehicles to cling to the crown of the road whether going slow or fast, thereby impeding traffic, due to the idea that it is necessary to keep an electric vehicle on the level to prevent acid in the battery cells from spilling.

It further pointed out that there is no danger from that condition when driving on the very slight incline found at the side of any Chicago streets and that the obvious course of a slow-moving electric would be along the curb, leaving the center to those who wish to drive at a higher speed.

### RITTMAN PROCESS A SUCCESS

WASHINGTON, D. C., September 11—Secretary Lane cancelled a contract today made by the Department of the Interior with the Aetna Explosives Co. of New York, under which the company had agreed to expend $200,000 in the development of the process discovered by Dr. Walter F. Rittman for the manufacture of benzol and toluol from petroleum. This action was taken because it is certain that the process is in such shape as to warrant its use by plants on a commercial basis.

Mr. Lane received information from A. J. Moxham, president of the Aetna company, that the system had shown itself to be thoroughly successful during the period of experimental development.

Certificates will now be issued by the Department of the Interior permitting any person or firm that can furnish assurances of good faith and is desirous of employing the process.

### Coming Commercial Vehicle Events

| | |
|---|---|
| Sept. 14-17 | Kineo, Me., New England N. E. L. A. Convention. |
| Sept. 16 | New York City, S. A. E. Regular Monthly Meeting. Automobile Club of America. |
| Sept. 18 | Whitestone Landing, L. I., Outing Motor Truck Club of America. |
| Sept. 20-25 | San Francisco, Cal., International Engineering Congress. |
| Sept. 24 | Indianapolis, Ind., S. A. E., first section meeting. |
| Oct. 4-14 | Wichita, Kan., Motor Exhibition, International Wheat Show. |
| Oct. 6-16 | New York City, Electrical Exposition & Motor Show, Grand Central Palace. |
| Oct. 11-12 | Dayton, O., National Paving Brick Mfrs.' Assn., annual meeting. |
| Oct. 14 | Chicago, S. A. E. Standards Committee Meeting. |
| Oct. 18-19 | Cleveland, O., Convention Electric Vehicle Assn. of America, Hotel Statler. |
| Oct. 19-20 | Detroit, Mich., Safety First Convention, Safety First Federation of America. |
| Nov. 29-Dec. 4 | Electrical Prosperity Week. |
| 1916 | |
| Jan. 29-Feb. 5 | Columbus, O., Motor Vehicle Show. |
| Jan. 29-Feb. 5 | Minneapolis, Minn., Motor Vehicle Show. |
| March 4-11 | Boston, Mass., Motor Vehicle Show, Mechanics' Hall. |

# Cleveland Trailers Threatened

## Charge Conspiracy Against Buckeye Trailer Users

CLEVELAND, O., September 13—Charges that petty politics prompted Mayor Baker and Safety Director Benesch to draw up an amendment to the traffic ordinances, prohibiting the use of trailers on motor vehicles, were made by Cleveland manufacturers and merchants, who prepared to make a hard fight to defeat the amendment. Benesch says he will introduce the amendment in council.

The traffic ordinance now permits the use of two trailers, but very few merchants use more than one small two-wheeled trailer.

In the form which Benesch has drawn the proposed amendment the fire department would be hit as hard as any merchant who used trailers, according to Fred H. Caley, Cleveland Automobile Club secretary. Hook and ladder companies which have motor tractor apparatus use trailers in the strict interpretation of the term. Benesch's amendment prohibits use of any vehicle with more than four wheels. Motor hook and ladder trucks have six wheels, the extension ladders and other equipment being placed on a two-wheeled trailer attached to the four-wheeled motor vehicle.

"The use of one trailer with rubber tired wheels should be permitted," Caley said. "Many painters, decorators and merchants find the use of a small two-wheeled trailer very economical in their business."

The proposed amendment will be fought by C. W. Hunt, manager of the Ohio-Buick Co., 1630 Euclid avenue. The company recently started selling two-wheeled trailers and, according to Hunt, they are being used extensively by farmers and small dealers because they are cheap and handle the business of their owners economically.

### CLAIMS PRIOR FRONT-WHEEL-DRIVE PATENTS

NEW YORK CITY, September 13—Claiming United States patents priority for the front-wheel drive as used on motor vehicles at the present time, John W. Moakler, East Worcester, N. Y., has issued a patent notice dated August, 1915, stating that all manufacturers of front-wheel-driven vehicles are violating his U. S. patent No. 766,191, of August 2, 1904, and that all parties making such vehicles, their agents and customers will be held responsible for damages.

The claims allowed in patent No. 766,191 cover broadly the use of a universal joint in proximity to the pivoted parts of a steering knuckle, either above or below the knuckle or at its center.

Mr. Moakler claims to have built a three-wheeled electric vehicle in June, 1888, and to have patented a four-wheel-driven, worm-driven electric vehicle under patent No. 500,022, dated June 20, 1893.

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# 2,469 Trucks Sold Abroad in July

## $6,803,001 Worth in 1 month More Than All 1914

WASHINGTON, D. C., September 13 —*Special Telegram*—Exports of commercial vehicles from the United States for the month of July, 1915, were 2,469, valued at $6,803,001, the greatest number and value of motor truck exports in the history of the industry excepting June, 1915.

A year before but 50 trucks, valued at $106,400, were exported, so that the increase for 1915 is over 49 fold in numbers and 64 fold in value. The total number of trucks exported in the fiscal year ended June 30, 1914, was but 784, valued at $1,181,611, so that the exports for July are over three times as great as for the entire year of 1914.

### $1,348,124 WORTH OF TRUCKS SHIPPED FROM N. Y.

NEW YORK CITY, September 7—Motor trucks valued at $1,348,124 were exported from the port of New York during the week ending August 28, according to a custom report just made public. No trucks were exported during the same week of the year previous.

### 5-YEAR BLAIR ORDER

NEWARK, O., September 10—The Blair Motor Truck Co., Newark, O., has received an order for motor trucks to be delivered in fixed quantities over a period of 5 years. Although the officials of the company are reticent about the details of the order, it is understood that it eminates from one of the large European exporters with headquarters in New York City and that the number to be delivered monthly exceeds thirty.

These trucks, it is understood, are to be 3-tonners and of the gasoline, worm-driven type which has been standard with the Blair company for several years. Another order for gasoline-electric vehicles made by the same concern is pending. It is emphatically stated that it is not a war order.

The plant has been thoroughly rehabilitated for the steady demand upon it that will result and J. P. McCune, general manager, is arranging for the requisite materials.

### BIG SELDEN EXPORT ORDER

ROCHESTER, N. Y., September 2—The Selden Truck Sales Co. today confirmed the report that a large order for Selden trucks had been received for export. The order was placed by Gaston, Williams & Wigmore, of New York and London, and is said to amount to more than $1,500,000. The chassis will be disposed of largely for commercial purposes, it is said, and are not a war order.

### KELLY NIGHT WORKERS QUIT

SPRINGFIELD, O., September 13—About 50 employes at the plant of the Kelly-Springfield Motor Truck Co., which has been rushed with war orders for motor trucks, went out on a strike at 10 p. m. September 10.

The first report circulated was to the effect that all of the strikers are Germans and they had quit their jobs in order to handicap the company in filling its orders as planned by the Austrian Ambassador, Dr. Constantin Theodore Dumba. This was promptly denied by officials of the company, who stated that announcement was made at the factory that the night force would be discontinued after September 11 for the present because the company is up on its war orders and that the men demanded that arrangements be made to pay them off at once. When this request was refused the men quit.

The men hastened for their homes as soon as they laid down their tools and none of them could be seen for their side of the story.

### ROWE CO. RAISE WAGES 10%

DOWNINGTON, PA., September 7—The Rowe Motor Co., this city, maker of Rowe motor trucks, has raised the wages of its machinists 10 per cent. It has also commenced work on the erection of a 100-foot addition to its plant.

### HURLBURT LEASES MOTT PLANT

NEW YORK CITY, September 2—The Hurlburt Motor Truck Co. has leased the old plant of the Jordan L. Mott Iron Wks., on Harlem river and Mott Haven canal, between Third avenue and One Hundred Thirty-third street.

### LENOX CO. TO MAKE TRUCKS

BOSTON, MASS., September 4—The Lenox Motor Car Co., of this city, has had plans prepared for the erection of a new plant in Lawrence, Mass., at which the company will manufacture motor trucks. The new factory will cost approximately $100,000, according to the present plans. It is expected that the manufacture of the Lenox passenger cars will be continued.

### RAWLE DRIGGS-SEABURY DIRECTOR

NEW YORK CITY, September 3—J. W. Rawle, for many years associated with the Bethlehem Steel Co. and at present vice president of the J. G. Brill Co., has been elected a director of the Driggs-Seabury Ordnance Co.

The board of representatives of the New York Market Assn. has formally listed the 30,000 shares of common stock, par value, $100, of the Driggs-Seabury Ordnance Co.

### NEW G. M. C.'s HAVE FOUR SPEEDS

In the description of G. M. C. worm-driven trucks in THE COMMERCIAL VEHICLE of September 1, it was erroneously stated that these vehicles had the conventional three-speed gearbox. These trucks have four-speed gearsets.

### DURYEA TO BUILD TRUCK

ROCHESTER, N. Y., September 2—The Crowther Motor Co. of Philadelphia is planning to establish a plant near this city for the manufacture of motor vehicles which will sell between $300 and $400 and also a truck, both of which will embody a number of new features developed by Charles E. Duryea. The plant will probably be placed on the Willis N. Britton tract, just north of Ridgeway avenue, in the town of Greece, and it is expected that it will be finished by January 1, 1916.

The car will be of the four-cylinder, air-cooled type.

# All-drive Peerless' to Russia

## Built on F.W.D. License on War Order for 200

CLEVELAND, O., September 11—The Peerless Motor Car Co. has received another large truck order from abroad, among which four-wheel-driven trucks are included, and arrangements have been made to manufacture the latter under license from the Four Wheel Drive Auto Co., Clintonville, Wis. It is expected that for the next 4 months twenty-five trucks will be manufactured daily, or a total of 3,000 in that time.

It is said that a recent French order, amounting to 500 trucks, has been split between the White and Peerless companies, the former getting the contract for 300 and the latter for 200. The Russian four-wheel-driven truck order is said to amount to 200.

### SIGNAL TRUCKS COST MORE

DETROIT, September 3—Prices of Signal motor trucks, made by the Signal Motor Truck Co., Detroit, have been raised from $50 to $100 in three instances and left as before in one. The new and old prices follow:

| Capacity | Old Price | New Price |
|---|---|---|
| 1 ton | $1,500 | $1,550 |
| 1½ ton | 1,700 | 1,750 |
| 2 tons | 2,000 | 2,100 |
| 3½ tons | 3,000 | 3,000 |

With the new prices, additional wheelbase options are being offered. On the 1- and 1½-ton models either 130- or 144-inch wheelbases may be had, the former charge of $50 for the longer frame having been discontinued and the purchaser given his choice at the same price. The 2-tonner is made only in a 150-inch wheelbase and 3½-tonner with one of 168 inches.

### POPE CREDITORS TO GET 38% DIVIDEND

BOSTON, MASS., September 8—A dividend of 38 per cent is to be distributed among the creditors of the Pope Mfg. Co., according to an order just handed down by Judge Dodge in the U. S. District Court to the receivers of the Pope company.

The total available for this purpose and for the expenses of the receivership amounts to $722,095. The court allowed $67,500 as compensation for the receivers, including counsel fees. Col. George Pope and C. A. Persons, two of the receivers, were discharged at their own request. The third receiver, C. A. Morse, has been retained to settle three disputed claims amounting to $20,000. The total of the claims allowed and approved amounts to $1,649,000.

### KELLY-SUNSET NAME TANGLE UNRAVELLED

SPRINGFIELD, O., September 10—Confusion has resulted from reports recently circulated to the effect that the Kelly-Springfield Motor Truck Co. had changed its name to the Sunset Motor Truck Co. James L. Geddes, president of the Kelly-Springfield Motor Truck Co., has therefore issued a statement in

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which he explains that the Kelly Motor Truck Co., which has nothing to do with the Kelly-Springfield Motor Truck Co., has changed its name to the Sunset Motor Truck Co. preparatory to dissolution.

The Kelly-Springfield Motor Truck Co. was organized in October, 1912, succeeding the Kelly Motor Truck Co., which retained its organization as a stockholder in the Kelly-Springfield company. It is now in a position to wind up its affairs and so to avoid confusion with the Kelly-Springfield Motor Truck Co. it has changed its name.

Mr. Geddes states as follows:

"There has been absolutely no change in the name or policy of this company. In fact, we are in a far better condition than ever before and expect to continue to manufacture Kelly trucks under our present name for a long, long time to come."

### REYNOLDS U. S. TIRE MANAGER

NEW YORK CITY, September 7—F. I. Reynolds has been made manager of the tire department of the United States Tire Co. to relieve O. S. Tweedy, assistant general sales manager, who will from now on take charge of all U. S. tire branches and depots. Mr. Reynolds was formerly tire sales manager for the B. F. Goodrich Co., Akron, O.

### GILBERT TO SELL GIBNEY TIRES

PHILADELPHIA, September 8—Joseph M. Gilbert was today elected vice president and director of sales of the Gibney Tire & Rubber Co., Conshohocken, Pa. Mr. Gilbert was formerly sales manager of the United States Tire Co., New York City.

President James L. Gibney announced at the directors' meeting that the business for the fiscal year ending August was highly satisfactory and a 6 per cent dividend was declared. Increased manufacturing facilities have quadrupled the plant's capacity in the past 4 months.

Mr. Gilbert has secured a large stock interest and will direct the sales from the New York office.

### KELLY TIRE BEHIND ORDERS

NEW YORK CITY, September 8—The Kelly-Springfield Tire Co. is now said to be 27,000 tires behind orders. As the Akron plant of the company only manufactures between 1,000 and 1,100 tires per day, this means that it is approximately a month behind orders on its books.

As announced in THE COMMERCIAL VEHICLE of August 1, 1915, the Kelly-Springfield company recently added steel-base band tires in both the pressed-on and demountable types to its line of sectional block tires.

Enlargement of the Akron plant is now under way and it is expected that by the first of the year the production of the new band tires will be 400 per day.

### NEW GOTHAM TRAILER MAN

NEW YORK CITY, September 10—C. H. Quercanx has succeeded F. H. Greaney as manager of the New York City branch of the Troy Wagon Works Co., maker of Troy trailers. The New York office is at 30 Church street.

### GRAY & DAVIS LOSE SCHWARTZKOPF

NEW YORK CITY, September 7—E. E. Schwartzkopf has resigned as sales manager of Gray & Davis, Boston, Mass. No future plans have been announced.

# Firestone Report Is Encouraging

## Sal s Increase 31%—Production to Be Gr. ater

AKRON, O., September 2—H. S. Firestone, president of the Firestone Tire & Rubber Co., manufacturer of Firestone tires, in an address before the annual meeting of the company held here yesterday, stated that the sales had increased 31 per cent and recommended an increase from 12 to 16 per cent in dividends on common stock October 15 and a 20 per cent dividend hereafter, payable in 5 per cent quarterly installments.

Mr. Firestone stated that the daily production of solid tires was 1,100 and that 7,500 pneumatics were turned out each day. Arrangements are being made for a 60 per cent increase in pneumatic production and a substantial increase in the solid class. Present directors and officers of the company were re-elected.

The sales of Firestone solid and pneumatic tires for the fiscal year 1915 amounted to $25,187,884.33, an increase of $5,937,774.41, or 31 per cent more than in 1914.

A statement submitted by the management gave the quick assets and liabilities as follows: Quick assets: Accounts receivable, $5,269,034.30; bills receivable, $123,480.91; cash set aside for new buildings and equipment contracted for, $800,000; cash on hand, $1,103,427.64; stock sold employes, $112,200.11, and material and finished goods on hand, $3,843,477.83, making a total of $11,251,620.79. Liabilities: Accounts payable, $675,064.79, and net quick assets, $10,251,620.00, a total of $11,251,620.79.

# Labor Threatens Parts Supply

## Makers of Components Contend With Worker's Demands

### LOCKOUT RUTENBER FOUNDERS

INDIANAPOLIS, IND., September 11—Hurry-up arrangements have been made by the Rutenber Motor Co., Marion, Ind., for Indianapolis foundries, including the American Foundry Co., to produce castings for Rutenber motors. At the Logansport, Ind., foundry of the Rutenber company, labor troubles have paralyzed the plant. Owing to disputes over piece-work rates followed by a lockout of 200 coremakers and moulders, the Logansport plant, which is devoted to castings entirely, had to be shut down. To keep the Marion machine, forging and assembly shops busy, outside help has been enlisted to supply castings.

### EISEMANN GRANTS 8-HOUR DAY

BROOKLYN, N. Y., September 9—A strike of 600 employes of the Eisemann Magneto Co. at the Bush Terminal plant for an 8-hour day which began on Tuesday, September 7, was ended today after a lay-off of 1½ days by the company granting the demands of its workers. The company originally offered the toolmakers an 8-hour day and the other 550 employes a 54-hour week and at first declined to make any other concessions. More conferences between the men and the officers of the company resulted in the granting of an 8-hour day to all the employes.

### WARNER MFG. CO. CUTS HOURS

TOLEDO, O., September 9—During the month of October, the Warner Mfg. Co., of this city, will reduce the working hours of its factory hands from 60 to 48 hours per week. The present scale of wages will be maintained, so that the men will receive the same amount for the 8-hour day as they did for the previous 10-hour day.

According to T. W. Warner, president of the company, the change was made voluntarily. The action is experimental, its permanency depending upon the men.

### WRIGHT BEARINGS CO. FORMED

NEW YORK CITY, September 7—Previously made by the Pennsylvania Shafting Co., Pottstown, Pa., Wright taper roller bearings will hereafter be produced by the Wright Bearings Co., a Delaware corporation recently organized with $600,000 stock.

### DUCK NOW WITH UNITED

NEW YORK CITY, September 13—George H. Duck, former president of the Motor Truck Club of America, Inc., and for the past year New York district manager for the Sewell Cushion Wheel Co., Detroit, has just been appointed general sales manager of the United Motor Truck Co., Grand Rapids, Mich. Mr. Duck will establish his headquarters at the United plant in Grand Rapids. Before joining the Sewell organization he was the manager of the motor truck department of the New York City branch of the Locomobile Co. of America, Bridgeport, Conn.

Mr. Duck is one of the charter members of the Motor Truck Club and the growth of that body has been due in a great part to his untiring efforts. He will take up his new duties at once.

### TUCKER CONCENTRATES ON TRUCKS

BOSTON, MASS., September 13—The J. C. Tucker Co., that has handled the Chase and Vim trucks in Boston and at Providence and had passenger car agencies as well as the two trucks, has decided to abandon the passenger car business entirely and center all its energies upon commercial vehicles practically of one line. At Providence it gave up the Paige and National agencies and at Boston it has dropped the Vim and may do the same in Providence, making it distributers of the Chase product solely. The maker of the Vim is now trying to secure an agent in Boston.

### DIVIDENDS DECLARED

DETROIT, September 2—The Packard Motor Car Co. of this city has just declared its regular quarterly dividend of 1¾ per cent on the preferred stock, payable on September 15.

LANSING, MICH., September 2—The Reo Motor Car Co., of this city, has declared its regular quarterly dividend of 2½ per cent and an extra cash dividend of 12½ per cent, payable October 1, to stock of record, September 20.

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# First Motor Reserve Corps Formed

## Los Angeles Owners Enlist in Defense Troop

LOS ANGELES, CAL., September 4—The first motor reserve corps organized in this country has recently been formed by the Los Angeles motor trade for volunteer service in case of war. The troop consists of fifty men and is already in training. In addition to a number of passenger vehicle representatives, the following dealers in motor trucks have enlisted:

Frank Howard, Buick; Edward Swanson, Commerce; T. J. Stoner, Mack and Saurer; Lynn C. Buxton, Moon; C. H. Smith, Moreland; L. V. Starr, Overland; Paul G. Hoffman, Studebaker.

The troop will devote itself mainly to matters pertaining to motor warfare, but will be organized along regular military lines, under the command of national guard and regular army officers. There will also be a surgeon and first aid corps.

Last Sunday the motor guardsmen indulged in rifle practice with the latest form of army rifles, and it is planned in future to spend a day each week on the rifle range.

### WOLVERINES PLEDGE WAR CARS

DETROIT, September 6—The Wolverine Automobile Club of Detroit has pledged 5,000 motor trucks and cars to Secretary Garrison of the War Department, to be mustered from present owners in case of war. The Wolverine Club is also endeavoring to pursuade other organizations of similar nature to take like steps to insure a supply of the indispensable motor auxiliaries to a twentieth century army.

### CO-OPERATIVE MISSOURI DELIVERY

CARTHAGE, MO., September 8—The Wolfe-Calhoon Delivery Co. of Pittsburg, Kan., will open headquarters in the Middle West building, Carthage, Mo., this month, and will install a delivery service with six trucks. The service will be the result of contracts with Carthage merchants for a delivery system on the co-operative plan.

### CO-OPERATIVE DELIVERY FAILS

CHICAGO, September 2—The Merchants Auto Delivery Co., Galesburg, Ill., operating a co-operative delivery system with motor trucks, discontinued business yesterday. Marshall Field & Co. are said to have purchased the vehicles owned by the defunct concern.

### DETROIT MAIL TRUCKS U. S. OWNED

DETROIT, September 1—Detroit is the first city in the United States in which the handling of its mail by the post office is done exclusively by motor trucks which are owned and maintained by the post office authorities. While many other cities throughout the country have let out the contracts for the handling of mail to concerns using motor trucks, Detroit is the first city in which this work will be done by government-owned vehicles.

The new system went into effect today when thirty-six new trucks were delivered to the post office department. Of these, twenty-four are Fords and the remainder Whites, of which one is a 3-tonner; seven of 1½ tons capacity and four of ¾ ton capacity. The 3 tonner will be used to carry mails to and from the main office to the various railroad depots in the city. The ¾- and 1½-tonners will be used in work between the main station and the various sub-stations while the Fords will be used for parcel post and collection work. All the trucks will be maintained in a local garage which is under the direct charge of one of the assistant postmasters.

The Detroit post office has had fourteen government-owned Wagenhals parcel cars in use for more than a year and the experience gained in the operation of these is said to have led to the belief that the handling of the mail could be done cheaper by government-owned vehicles than by the contract system. The experiment will be watched with interest by other post offices throughout the United States.

### FIRE DESTROYS 76 TRUCKS

NEW YORK CITY, September 8—Seventy-six motor trucks were either partially or entirely destroyed in a fire which gutted the Eleventh Avenue Garage at Twenty-fifth street last night. The fire was of unknown origin. It began at midnight and spread with such rapidity that practically all of the trucks took fire simultaneously, so that all of them had to be pulled out the building. Only gasoline trucks were garaged in the building and it is thought that the explosion of some gasoline was responsible, although the fire spread so quickly that it origin could not be determined.

The garage building is a total loss, only the walls and a few of the girders supporting the roof remaining in place. Plans are now being made to rebuild the structure at once.

### SAMUEL T. DAVIS

FAIRFIELD, CONN., September 1—Samuel T. Davis, president of the Locomobile Co. of America succumbed to ptomaine poisoning today at his summer home here. He had been ill several days. His death was untimely, as he was but 42 years of age.

Mr. Davis was born in Washington, D. C. He graduated from Rensselaer Polytechnic Institute, New York City, in the class of 1895 and later became connected with Amzi L. Barber, of the Barber Asphalt Co., as assistant general manager of the plant at Port of Spain, Trinidad.

Mr. Davis was made manager of the Locomobile Co. when it was formed by Mr. Barber in 1899. He later became its president.

Mr. Davis founded and became the first president of the National Assn. of Automobile Mfrs., now consolidated with the Automobile Board of Trade into the National Automobile Chamber of Commerce, which he was a director.

Besides being a pioneer in the motor car business, Mr. Davis was interested in manufacturing enterprises and a banker.

He is survived by Mrs. Davis, who was Irene Barber, Amzi Barber's daughter, whom he married in 1897, and a daughter.

# Postal Truck Bids All Opened

## Forty-three Quotations Made for 100 Mail Vehicles

WASHINGTON, D. C., September 8—Under a call for bids for furnishing 20 or more gasoline motor trucks for the postal service during the fiscal year ending June 30, 1916, the purchasing agent of the post office department today opened 43 bids from various manufacturers and dealers. The quantities to be purchased are 5 or more of one-half ton capacity; 5 or more of three-quarters ton capacity; 5 or more of 1½ tons capacity and 5 or more of 3 tons capacity.

It is possible before the end of the contract year that the department will purchase 100 trucks under the propositions received today. The contracts are expected to be awarded on or before October 1 next.

The bids were submitted under these classifications: A, trucks of one-half ton capacity, complete with body; B, trucks of three-quarters ton capacity, complete with body; D, trucks of 1½ tons capacity, complete with body; DD, trucks of 1½ tons capacity, with slight changes in specifications from class D trucks; F, trucks of 3 tons capacity; FF, trucks of 3 tons capacity, with slight changes in specifications from class F trucks. The bidders and their prices were as follows:

O. K. Motor Truck Co., Flint, Mich., f. o. b. Flint. Class B, $975; $975; $1,000; $975; $1,025; $975; $978.

Warren Motor Truck Co., Warren, O., f. o. b. Warren. Class B, $1,550; $1,450; class D, $1,885; $1,785; class DD, $1,925; $1,825; class F, $2,550; $2,450; class FF, $2,550; $2,450.

Union Garage Co., Washington, D. C., f. o. b. Washington. Ford, class A, $600.

F. N. Harper, Washington, D. C., f. o. b. Toledo. Overland, class A, five bids, $600.

Commercial Garage, Washington, D. C., Bessemer, class B, three bids at $1,225; $1,175; $1,250; $1,225; class D, $2,090; $2,025; $2,090; $2,065; $2,090; $2,205; class DD, $2,090; $2,025; $2,090; $2,065; $2,090; $2,205; class F, $2,200; $3,305; $3,280; class FF, $3,350; $3,375; $3,350.

Tiffin Wagon Co., Tiffin, O., Class B, $1,344; $1,297; $1,244; $1,322; $1,297; class D, $1,738; $1,660; $1,685; $1,713; $1,660; class DD, $1,742; $1,664; $1,689; $1,717; $1,664; class F, $2,263; $2,238; class FF, same bids as class F.

Semmes Motor Co., Washington, D. C., Class A, Wilcox, $1,210; Vim, $775; class B, Wilcox, $1,775; class D, Wilcox, $2,050; class D, $2,160.

Chas. A. Leichliter, Chicago, Ill., f. o. b. Detroit; class A, three bids at $931.50; $800; class B, three bids at $1,872.50; $1,912.50; class DD, four bids at $1,950; $1,990; class FF, $3,300; $3,275.

Wadsworth Mfg. Co., Detroit, f. o. b. Detroit. Ford, Class A, $580.80; $578.80; $591.80; $578.80; $590.80; $578.80.

Dart Motor Co., Waterloo, Ia., f. o. b. Washington; Class A, two bids at $1,145; $1,095; $1,180; class B, two bids at $1,715; $1,665; $1,750; class D, $2,265; $2,190; $2,300; $2,265; $2,365; class F, $3,190; $3,165.

Miller Bros. Automobile & Supply House, Washington, D. C., f. o. b. Washington. Ford, class A, $638.50, with various supplemental bids; class B, Flint, $1,364.

Commercial Automobile & Supply Co., Washington, Studebaker; class A, $940; $965; class B, $960; $985; this bidder also made several supplemental bids for equipment.

Peerless Motor Car Co., Cleveland; f. o. b. Cleveland; class F, $3,455; $3,410; class FF, same prices as class F.

Lippard-Stewart Motor Car Co., Buffalo, f. o. b. Buffalo; class A, $996.50; $1,015.50; $996.50; class B, $1,438; $1,438; $1,463; $1,438; $1,466; $1,438; class D, $2,140; $2,115; $2,140; $2,115; $2,115; class DD, same prices as class D.

Commerce Motor Car Co., Detroit, f. o. b. Detroit; class B, $975; $995; $985; $1,030; $1,015.

DeKalb Wagon Co., DeKalb, Ill., class D, $2,175; $2,100; $2,125; $2,100; $2,100; class DD, same prices as class D.

International Harvester Corp., Chicago, f. o. b. Akron, O., class A, five bids at $1,040; $1,000; class B, $1,040; $1,000.

Dudley Power Car Co., Charlotte, Mich., class F and FF, $3,300.

Buick Motor Co., Detroit branch, f. o. b. De-

(Continued on page 27)

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# Truck Club Outing

## To Be Held September 18, at Whitestone Landing

NEW YORK CITY, September 10—Saturday, September 18, is the date of the fourth annual outing of the New York Section of the Motor Truck Club of America, Inc. The place is Duer's pavillion, Whitestone Landing, L. I. The time is 12:30 p. m. From the foot of east Forty-second street the boat will carry the members and their friends to the shady park up the sound. The price is $3 for a gentleman's ticket and $2 each for the ladies.

On the 2-hour sail up the sound on the spacious 6,000-ton boat donated for the purpose by H. P. Cavarly, of the National Lead Co., Brooklyn, N. Y., deck games will while away the time until Duer's is reached when a short athletic program, consisting of short races for both men and women, will be staged in addition to a baseball game, tennis, etc. There will also be dancing and bowling for those so inclined. Valuable prizes will be awarded to the winners in each competition. The price of a ticket includes a dinner served at the pavilion before the boat leaves on the return trip to the city.

Duer's pavilion may also be reached by Long Island trolleys. It is also on one of the main roads along the north shore of Long Island.

Tickets may be secured from the club office, 1790 Broadway, City, telephone 4344 Columbus.

### S. A. E. GOVERNOR REPORT SEPT. 16

NEW YORK CITY, September 4—The aeroplane and its development during the present war will be the subject of the regular September meeting of the New York section of the S. A. E., to be held at the Automobile Club of America, 247 west Fifty-fourth street, on Thursday evening, September 16, at 8:30 p. m. The address of the evening on that subject will be delivered by Leon Goldmerstein, vice president of the Aeronautical Society. The final report of the Research Committee on Motor Vehicle Governors will also be read by H. G. McComb, chairman.

### TRUCKS AT STATE FAIR

DETROIT, September 6—State fairs as places of exhibition for motor trucks are coming more into the favor of commercial vehicle manufacturers. At the Michigan State Fair opened here today there are fourteen commercial vehicles as against fifty-nine passenger cars. Last year there were but six at the show.

Truck makers exhibiting at the state fair state that while they do not expect to close sales at the show, the new prospects which they acquire there are often very promising. One of the last year's exhibitors states that five sales were made soon after the fair exclusively to prospects registered there. Another is quoted as stating that he closes more sales to prospects registered at the state fair than at the motor vehicle show in the winter.

There were ten makes of commercial vehicles on display as follows: Buick, Columbia, Commerce, Denby, Federal, G. M. C., Independent, Overland, Reo, Signal, Standard, Studebaker and Vim. The Ford tractor was on exhibition for the first time and the Olsen tractor wheel for Fords. The latter consists of a steel wheel, interchangeable with regular Ford wheels, which has a rim taking either solid, pneumatic or steel studded tires for different classes of work. It is made by the Swedish Crucible Steel Co., Detroit and Windsor, Ont.

### FOUR ELECTRIC VEHICLES AT GOTHAM SHOW

NEW YORK CITY, September 13—Four electric vehicle manufacturers, of which three are makers of commercial models, will exhibit at the Electrical Exposition and Motor Show to be held at the Grand Central Palace here October 6 to 16, and several makers of electric vehicle parts and accessories.

The U. S. Army will also exhibit field radio sets and one of its wireless telegraph gasoline tractors. Electric vehicle exhibitors so far alloted space follow:

Anderson Electric Car Co., General Vehicle Co., Baker-R. & L. Co., Ward Motor Vehicle Co. Accessory makers are: Philadelphia Storage Battery Co., Edison Storage Battery Co., Electric Storage Battery Co., Cooper Hewitt Electric Co., Westinghouse Electric & Mfg. Co., General Electric Co. and H. W. Johns-Manville Co.

### 7,453 TRUCKS IN PENN.

HARRISBURG, PA., September 3—There are 7,453 motor trucks registered in the state of Pennsylvania, according to registration reports just compiled. The number of motor vehicles registered in the entire state up to and including August 30, is 138,406, including the 7,453 trucks.

Figured at an average value of $1,000 per vehicle, the present number represents an investment of $138,406,000.

### FEDERAL HOLDS CONVENTION

DETROIT, September 3—Seventy-five dealers and distributers of Federal motor trucks attended a 3-day convention here this week. This concention is an annual affair with the Federal Motor Truck Co. Reports of practically all of the delegates agree that the past year has been an exceptionally good one, and in return they were given to understand that the Federal company would be in a position to keep its delivery promises. If this proves to be the case, it is predicted that great increases will be made in the number of trucks sold all over the country. The greatest difficulty which the Federal company has had in keeping up with orders is in getting materials and parts.

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**Fred Cardway,** late director of the Michigan branch of the U. S. Bureau of Foreign and Domestic Commerce, has been put in charge of the Packard Motor Car Co.'s bureau of foreign trade.

# New G. V. Tractors

## Special Vehicles for Street Cleaning in New York

NEW YORK CITY, September 11—Father Knickerbocker will soon put to work in his model street-cleaning district twelve new gas-electric tractors and semi-trailers for the house-to-house collection of garbage, ashes and rubbish, each of which is calculated to displace five of the horse vehicles now in use. The tractor units are being manufactured by the General Vehicle Co., Long Island City, N. Y.

Besides the feature of the gas-electric type of drive, the new units are also characterized by a special type of steel trailer body which is of the double-decked type and which is made up of several separate crosswise units, each of which may be removed separately for unloading. Ashes and garbage are placed in the lower halves of the trailer units while the upper parts are used for rubbish and paper.

The new apparatus will operate in the district bounded by Fifth and Sixth avenues to the East river, from Fourteenth to Forty-second streets. Each unit will have a crew of five men.

To facilitate dumping the department has erected a traveling crane system at its dock at the foot of east Nineteenth street. The cranes will lift off the trailer units bodily and swing them out over the scows where they will be unloaded. Illustrations and a more detailed description of the vehicles will be published in a subsequent issue of THE COMMERCIAL VEHICLE.

### FEDERAL OWNERS' CONTEST CLOSED

DETROIT, September 3—The contest started some months ago by the Federal Motor Truck Co., of this city, among the owners of Federal trucks for the fifteen best answers to the question, "Why I Bought a Federal," has been brought to a close and the cash prizes of $300 paid, although the names of the winners have not as yet been announced. The requirements of a motor truck from a users' standpoint as brought out in the hundreds of answers received were as follows: Simplicity in design; economy, not cheapness, in initial price; economy in upkeep and repairs; the reputation of the truck in all lines of work and the stability of the truck manufacturing concern.

In addition to the $300 awarded in cash prizes, every owner who entered the contest was presented with a gold-plated Federal watch chain.

The results of the contest were more than gratifying to the Federal company, for the letters provided it with the users' viewpoint in the purchase of motor trucks. Every letter, to be eligible in the contest, had to give the numbers of the Federal trucks owned by that concern. This proved valuable as a means of checking up the owners' records with those of the Federal factory.

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# Ball Bearing Treatise

## New Departure Anti-friction Bearing Compendium

BALL BEARINGS, their development, design and application, are discussed in a new thirty-eight page booklet recently published by the New Departure Mfg. Co., Bristol, Conn., which is one of the most comprehensive non-technical discussions of ball bearings and their value that has yet appeared.

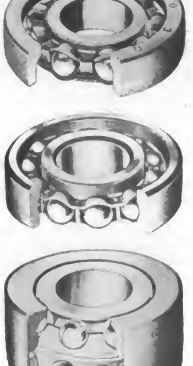
The book is given over to the use of ball bearings on motor vehicles and the loads which they have to sustain under different conditions are defined and illustrated with half-tone and line illustrations bringing out the cardinal points of the discussion. The lines of force to which the bearings is subjected under certain conditions are drawn with lines of different lengths proportional to the forces exerted and the resultant load on the bearing indicated, with the manner in which it is taken up by the bearing.

The principle of the ball bearing is clearly brought out by means of three illustrations depicting the experiment of sliding a book over a table, first, with the book directly on the table; second, on two pencils, and third, on four balls, one at each corner. These three cases indicate the difference between sliding, rolling and ball friction.

Several pages are given over to a description of the four types of New Departure bearings, the single-row radial type, the double-row type for combined radial and thrust loads, the cup-and-cone type, and the magneto type for high-speed work. Each of these types is pictured in sectional and phantom views showing the shape of the race grooves, the retainers and the method of assembly.

### Rigid Inspection

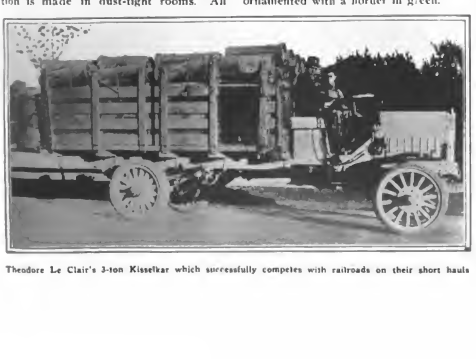
During the manufacture of the bearings each part is inspected and ganged both by the operators at the machines and by the inspectors. The final inspection is made in dust-tight rooms. All the gauges are checked at least once a day to master gauges and standards approved by the United States Bureau of Standards. Two of these devices, the microscopic master measure, by which other measures are ganged, and the optical compressometer, used to determine the elastic properties of steel balls, are pictured and their method of use described.



New Departure cup-and-cone, radial and double-row ball bearings

The last six pages of the book contain the price lists of the various sizes of the four types of New Departure bearings.

The booklet is 6 by 9 inches and is printed in brown type on a buff-colored gloss paper with a dark brown cover ornamented with a border in green.



Theodore Le Clair's 3-ton Kisselkar which successfully competes with railroads on their short hauls

# Short Haul Riddle

## Motor Trucks Profitable Where Railroads Are Not

SHORT hauls for railroads are often long hauls for trucks. It has frequently been suggested that the motor truck will prove the final solution to the generation-long problem of the long and short haul for freight railroads. The cost per mile of freighting by rail diminishes with the length of haul, as with everything else except, possibly animal-drawn freight conveyances. On long hauls—from perhaps 50 up into the thousands of miles—the railroad is the cheapest form of land transportation; but as the haul get shorter, and the possible amount of travel per hour is reduced, the cost of railway freighting becomes very high.

The railroads have constantly asked to be permitted to charge higher rates for short-haul work, but have never been allowed to charge enough to pay the cost of such transportation. Naturally enough, with this work unprofitable, the railroads have never exerted themselves to give extraordinary service. It is well known that one can ship freight direct for hundreds of miles in less time than across such a city as New York, Chicago or St. Louis, a matter perhaps of 10 miles.

An example of the superior and economical service which motor trucks give in competition with the railroads is given in a letter written by Theodore Le Clair, Oakland, Cal., describing a trip he made with a 3-ton Kisselkar:

### Actual Testimony

"On Wednesday morning I left Oakland, bound for a ranch 10 miles out of Ukiah, Mendocina county, with a load of household goods weighing 3 tons, going via the Tunnel road to Martinez. I passed through Martinez, Vallejo, Napa, St. Helena, Geyserville, Cloverdale, Hopland and Ukiah.

"The roads were in good condition to Cloverdale, but from there on the state highway was under construction, which proved a severe test for the truck. The grades were heavy and covered with loose sand and rock, and in many places soft yellow clay. But I was never forced to put my machine below second gear, and most of the time traveled in high.

"I reached Ukiah at dark, still having 10 miles of the hardest part of the journey to go. I had only oil lamps to show the way up a dark canyon by what is called the Boonville road. This road is a continual climb for over 5 miles, which I took on low gear so that I could make the hundreds of sharp bends possible. During this 5-mile climb on low gear my engine did not get hot enough to boil over, which is a feat most noteworthy.

"I returned via Santa Rosa, Sausalito, and San Francisco, reaching Oakland Friday, in the afternoon. Not a mishap was experienced in the whole trip and my engine ran like a clock. This transportation by motor truck was cheaper than by railroad, also doing away with that dreaded packing and crating."

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# Study of Efficiency Made Trucks Pay

## Buffalo Bed and Tool Manufacturer, After 7 Years Of Truck Experience Studied His Haulage Methods and Drafted a Policy—Following It Out, He Has Realized His Expectations

By Lawrence N. Hardy

KNOW-IT-ALLS lose out in truck use. Barcalo of Buffalo is not of this kind. He had used trucks for 7 years, but he discovered that the more he learned the more he found that needed study. Alone, and with no expert aid save that afforded by his own men, Mr. Barcalo put into practice all he had ever read or heard about motor truck efficiency and made an exhaustive study of his own operating conditions with the result that he outlined a definite trucking policy. He followed it and a year later the results had spoken for themselves.

He decided to eliminate horses from his delivery scheme and to substitute an all-motor equipment. He found that time was being needlessly wasted by little things here and there, and surprised himself when he figured out what leaking minutes meant when they were appraised by the bookkeeper. He stopped most of the leaks and put ginger in where sloth formerly ruled.

Today his trucks are doing good work, they pay and Mr. Barcalo's efforts have been well repaid. He has not stopped watching his trucks, for he believes in them, he knows.

Two years ago E. J. Barcalo, president and general manager of the Barcalo Mfg. Co., Buffalo, N. Y., after 7 years of experience with both motor trucks and horse wagons, made an exhaustive study of his trucking and teaming conditions to determine which was the most efficient and to decide upon which method, animal or motor haulage, to chose as a final standard.

He prepared a performance record, studied the work of both classes of vehicle, and wrote a report, published herewith. Since then Mr. Barcalo's conclusions have been proven sound, and the Barcalo company no longer employs horses.

At the time the report was made the concern had one wagon, two teams and three motor trucks. The first truck was a Rapid, bought 7 years previous—1908—which was followed by two other Rapids.

The first two Rapids served their terms and were duly disposed of, the 7-year-old being sold only a short time before the report was made. The remaining Rapid, which is still on the active list at the Barcalo plant, is 5 years old. The other two trucks were a Federal and a Lippard-Stewart.

The Rapid is of 2 tons capacity, the Federal 1½ tons, and the Lippard-Stewart of 1,500 pounds. Since then one more Lippard-Stewart has been purchased, this of 1½ tons capacity. The Federal is 3 years old and the smaller Lippard-Stewart is nearly 3 years of age.

The Barcalo fleet under the walls of the Barcalo plant. Note the three doorways to the right, leading into the loading bay

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When the last Lippard-Stewart was bought the last of the horses were sold.

The Barcalo business is the manufacture and wholesale distribution of brass and iron bedsteads, springs, mattresses and small tools. The latter business is a new departure. Ten per cent of this business is local to Buffalo, ninety per cent being delivered to more or less distant points by freight. However, although the Barcalo company has its own freight siding, only 20 per cent of the 641 average tonnage per year is loaded directly into the cars, the balance or 80 per cent of the product being trucked over the streets for shipment in less-carload lots from the freight terminals or delivered locally. The hand tool shipments are almost entirely forwarded from the terminals, as single shipments rarely constitute full carloads of these small wares.

Consequently there is a great amount of haulage work and delivery for the Barcalo trucks to perform. This work is divided into two classes, freighting and delivering. The Rapid, the larger Lippard-Stewart and the Federal are used on the freighting hauls and the smaller Lippard-Stewart and sometimes the Federal are sent out with city deliveries.

### No Long Hauls

Buffalo is a compact city, and the radius of city deliveries does not exceed 5 miles from the plant. The freight houses and steamship docks are even closer, so that here is by no means a case of the obvious efficiency of trucks on long hauls. It is mostly short-haul work, and Buffalo streets do not average exceptionally good. In the business and shopping centers asphalt in good condition prevails, but in the manufacturing districts, which are of great extent in this industrial city, cobble stones in rather imperfect repair are found in profusion. The deliveries being only to stores, on the city runs, the excellent streets in the residence portions of the city avail the Barcalo trucks nothing.

### Average Haul 1¼ Miles

The average city delivery haul is 1¼ miles and the freight terminal hauls are even shorter. Of the seven principal terminals, three, the D. L. & W., the Lake Shore and the Erie, are only ½ mile distant; two, the steamship docks and the Michigan Central, are 1 mile away, and the other two, the Wabash and Grand Trunk, respectively, are 1½ and 2 miles distant.

The experience of this firm is that most of its trucks are too small, the observer for THE COMMERCIAL VEHICLE finding practically all of them operating under overloads and showing the effects. Two tons is stated to be the ideal capacity for this work. By this is not meant that the average load on the freighting trucks is 2 tons, but rather that this is the maximum. Trucks should be selected for their maximum duty if one is to be insured against the disasters of overloading.

The average city load consists of forty pieces weighing about 1,200 pounds in all, and for this work a 1-ton vehicle would be sufficiently large.

Freight loads average sixty pieces and weigh 1,500 pounds to 1½ tons. About 10 per cent of the freight house trips are

## Barcalo's Confession of Faith

THE work done by each team and by the motor truck just about balanced. One wagon made five pick-up loads in one week, and the truck two, but the truck made one long city trip. Then the wagons are paid for 3,420 minutes per week and the trucks 3,300 minutes each week. We pay $33 per week for teams and the total cost of operating one of our trucks figures about $45 per week.

If the average of a team is twenty-six loads per week, to keep the cost the same trucks should haul about thirty-six loads, but it falls a little short, and consequently the truck cost is a little high. The figures per load are:

| | |
|---|---|
| Teams | $1.26 |
| Trucks | 1.38 |

In this showing, however, the teams have this advantage:

We own one extra wagon, and the owner of the teams leaves here one extra wagon, and both these are loaded while the teams and drivers are out. Consequently the report shows less In time. The report shows that the wagons are in 27 minutes between trips and the trucks 42 minutes between trips.

Now assuming that the In time of both will be the same as the report for the teams, and that the trucks are employed 3,420 instead of 3,300 minutes per week, the showing would be for the one motor truck:

2,711 minutes out (3,420 — 709 minutes in) 2,711 ÷ 59 (minutes per trip) = 46 loads per week $45 ÷ 46 (loads) = 98 cents per load against $1.26 for wagons.

Based on the present time average In time—27 minutes—two trucks will about do the work now done by three teams, two extra wagons and one truck, but, of course, there would be no margin and there would be no extra bodies to load between trips. Three machines surely would do for freight and delivery and pick-up work, and five would surely do for all our work.

A study of this report will show that there is abundant room for improvement in service, and plenty of opportunity for a saving in cost. In two directions a saving can be made:

1—The 27 minutes In time can be reduced to approximately 5 minutes.

2—Out time on given routes can be reduced.

Assuming that we have five machines with three operators, and the fourth operator employed in the factory for reserve; we could send each machine out on about 46 trips a week without cutting down the average time per trip as shown by this report. We could urge D-P to unload us in less than the usual time.

The report shows that the wagons consume from 65 to 140 minutes in making these trips. I believe this could be reduced a great deal.

I think a study of the freight-station situation would reduce the time consumed in these hauls. The wagons require for delivery to the Pennsylvania Railroad from 60 to 115 minutes; to the D. L. & W., 90 to 175 minutes. The truck requires from 35 to 105 minutes to the D. L. & W. and 45 to 75 minutes to the D. & B.

The above variations in time are positively without reason.

I believe that five machines, preferably uniform in type, with three drivers and one extra driver employed in the shop, would do all our work, but we would be obliged to arrange for some other than the present method of unloading cars of lumber.

I do not believe it wise to try to do with three or four machines and five removable bodies. The difference in the first cost is considerable, it is true, but the cost does not end with the purchase of the cars. The truck ready to run would cost around $2,500. If all bodies were removable and they were made to swing over the driveway, or were built with cages and tracks, the total extra cost of the special bodies would amount to within $1,000 of the cost of an extra vehicle.

By having the extra truck we would save the space occupied by cages, if cages were to be used, and we would save the necessary mechanical operation of changing bodies forty-six times a week for each machine, and we would also have reserve motor capacity, which would not be provided for under the extra body plan. Good drivers at good wages, with a bonus plan of some sort worked out, will bring results. We will buy probably five x —— 1½-ton worm-driven trucks. The performance of the one we have used since spring is sufficient to justify this selection.

E. J. Barcalo.

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with return loads. The freight trucks average four trips per day and the city delivery vehicles six. When the city loads are exceptionally heavy the Federal will make one less freight house trip and several trips on the city runs.

No helpers are sent out with the Barcalo trucks, as loading and unloading conditions are generally good. Schedules are maintained with great regularity except when the snow and ice necessitates slower speed. The plant operates 9 hours per day, with a full day on Saturday, 300 days a year.

### Terminal Delays Small

Terminal conditions in Buffalo are good, the average unloading time being but 20 minutes, and slightly longer to load a consignment of incoming goods. At the plant every effort is made to expedite the movement of the trucks. Each truck is checked in and out on every trip, so that excessive loading time is noted and looked into promptly. Cause for waste time at the loading platform is removed by an admirable loading scheme and by turning the whole shipping room force of seven or eight men onto the loading when necessary.

The shipping room and loading platform are one, and are both entirely within the building. The trucks occupy a loading bay, sheltered from rain or snow, and fitted with outer doors which may be closed in cold weather. These doors operate individually, and as the loading bay also serves as the garage for the trucks, there is never any crowding or waiting for a place to load. Loading takes an average of 30 minutes per load.

In the morning the trucks are on the job ready for their loads without any preliminary run from the garage to the plant, and when they return at night, their day is done. This saves a small but not inconsiderable amount of time each day, and with ground rent comparatively low in the manufacturing district, it is a good investment for the firm.

An expert mechanic maintains the vehicles, a motorcycle being kept ready at a moment's notice to respond to an emergency call from a disabled vehicle. A bonus system which has encouraged the men to do their best in the shop has been extended to the drivers with gratifying results.

Just as when the first comprehensive report on trucking mas made, the Barcalo company is continually on the *qui vive* to improve the operating conditions which largely dictate the efficiency of the trucks.

### Co-operation With Customers Pays

Recently a large local customer complained that he was not getting good service. Investigation showed the Barcalo men that the fault was with the receiving room force of the customer himself, of which he was entirely ignorant. When

# Analysis of Truck and Team Work Made September, 1914

## Cartage by Teams—Railroad Deliveries and Pick-ups

**1 Week of 3,420 Minutes—6 Days of 9½ Hours**

Team No. 1

| Loads | To | Minutes Out | Minutes In |
|---|---|---|---|
| 1 | B. R. & P.—Pick-up | 250 | 50 |
| 1 | D. L. & W.—Pick-up | 250 | 20 |
| 1 | D. L. & W.—Pick-up | 395 | 15 |
| 1 | Pick-up | 270 | 0 |
| 1 | Pick-up | 150 | 0 |
| 1 | M. C.—C. & B.—Pick-up | 190 | 80 |
| 2 | Pick-up | 270 | 0 |
| 1 | Delivery—Pick-up | 155 | 10 |
| 1 | Delivery | 125 | 105 |
| 1 | N. Y. C.—B. & S. | 145 | 45 |
| 1 | Pennsylvania—W. S. | 205 | 10 |
| 1 | D. & B.—C. & B.—D. & L. | 65 | 5 |
| 1 | N. Y. C.—W. B. | 80 | 70 |
| 1 | D. L. & W.—Erie | 200 | 100 |
| 1 | B. R. & P.—D. L. & W. | 150 | 10 |
| 16 | | 2,900 | 520 |

Team No. 2

| | | | |
|---|---|---|---|
| 1 | Pennsylvania | 60 | 55 |
| 1 | Pennsylvania | 70 | 5 |
| 1 | Pennsylvania | 115 | 25 |
| 1 | Pennsylvania | 80 | 35 |
| 1 | Pennsylvania | 75 | 15 |
| 1 | Delivery | 125 | 10 |
| 1 | Delivery | 65 | 15 |
| 1 | Delivery | 75 | 10 |
| 1 | Delivery | 120 | 10 |
| 1 | Delivery | 85 | 10 |
| 1 | Delivery | 140 | 40 |
| 1 | Delivery | 85 | 5 |
| 1 | Delivery | 130 | 20 |
| 1 | Delivery | 100 | 5 |
| 1 | W. T.—B. R. & P. | 120 | 5 |
| 1 | C. & B.—D. & B. | 115 | 5 |
| 1 | C. & B.—D. & B. | 130 | 60 |
| 1 | D. L. & W. | 90 | 25 |
| 1 | D. L. & W. | 175 | 15 |
| 1 | M. C.—N. Y. C. | 145 | 5 |
| 1 | M. C.—N. Y. C. | 75 | 10 |
| 1 | M. C.—N. Y. C. | 105 | 75 |
| 1 | N. Y. C.—L. S. | 100 | 40 |
| 1 | W. S.—M. C. | 140 | 130 |
| 1 | Hall Co. | 140 | 25 |
| 1 | N. Y. C. | 90 | 15 |
| 26 | | 2,750 | 670 |

Team No. 3

| | | | |
|---|---|---|---|
| 1 | Pick-up | 110 | 160 |
| 1 | Pick-up | 70 | 15 |
| 1 | Pick-up | 85 | 35 |
| 1 | Pick-up | 75 | 0 |
| 1 | Pick-up | 160 | 10 |
| 1 | Pick-up | 70 | 55 |
| 1 | Pick-up | 85 | 15 |
| 1 | Pick-up | 105 | 50 |
| 1 | Pick-up | 105 | 50 |
| 1 | Pick-up | 95 | 15 |
| 1 | Pick-up | 95 | 26 |
| 1 | Pick-up | 165 | 45 |
| 1 | Pick-up | 15 | 45 |
| 1 | Pennsylvania | 70 | 70 |
| 1 | Pennsylvania | 80 | 10 |
| 1 | Pennsylvania | 85 | 10 |
| 1 | Pennsylvania | 130 | 60 |
| 1 | Erie—Wabash | 40 | 35 |
| 1 | Wabash—L. S. | 95 | 15 |
| 1 | Erie | 210 | 40 |
| 1 | D. L. & W. | 115 | 25 |
| 1 | D. & B. | 50 | 5 |
| 1 | Penn.—Erie | 160 | 45 |
| 1 | L. S.—Erie | 100 | 15 |
| 1 | Load to car | 45 | 45 |
| 1 | Load to car | 20 | 20 |
| 1 | Load of lumber | 40 | 5 |
| 1 | Load of lumber | 20 | 10 |
| 28 | | 2,495 | 925 |

Totals

| | | | |
|---|---|---|---|
| 16 | Team No. 1 | 2,900 | 520 |
| 26 | Team No. 2 | 2,750 | 670 |
| 28 | Team No. 3 | 2,495 | 925 |
| 70 | Sub-total | 8,145 | 2,115 |
| 35 | Previous week, one wagon | 2,592 | 723 |
| 105 | Grand Total | 10,737 | 2,838 |
| Average per load | | 102 | 27 |
| Average per delivery and pick-up load for 2 weeks | | 80 | |
| Average cost 105 loads at $33 per week each | | $1.26 | |

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## Cartage by Motor Truck—Railroad Deliveries and Pick-ups

**1 Week of 3,300 Minutes—5½ Days of 10 Hours**

| Loads | To | Minutes Out | Minutes In |
|---|---|---|---|
| 1 | Delivery | 65 | 65 |
| 1 | Delivery | 75 | 15 |
| 1 | Delivery | 70 | 50 |
| 1 | Pickup | 85 | 35 |
| 1 | Pick-up | 60 | 50 |
| 1 | Pick-up | 62 | 110 |
| 1 | Pick-up | 55 | 35 |
| 1 | Load to car | 30 | 115 |
| 1 | Load to car | 35 | 30 |
| 1 | Load to car | 30 | 20 |
| 1 | Load to car | 20 | 15 |
| 1 | Load to car | 20 | 15 |
| 1 | Load to car | 17 | 10 |
| 1 | Load to car | 25 | 23 |
| 1 | Load to car | 30 | 10 |
| 1 | Load to car | 30 | 15 |
| 1 | Load to city | 120 | 15 |
| 1 | D. L. & W.—B. R. & P. | 40 | 55 |
| 1 | D. L. & W.—B. R. & P.—G. T. | 70 | 50 |
| 1 | D. L. & W. | 105 | 40 |
| 1 | D. L. & W. | 50 | 30 |
| 1 | D. L. & W. | 60 | 20 |
| 1 | D. L. & W. | 40 | 25 |
| 1 | Lehigh Valley | 35 | 10 |
| 1 | Penn.—N. Y. C. | 130 | 20 |
| 1 | Erie | 40 | 30 |
| 1 | D. & B.—C. & B. | 65 | 20 |
| 1 | D. & B. | 75 | 63 |
| 1 | D. & B. | 45 | 5 |
| 1 | D. L. & W.—Wabash | 90 | 75 |
| 1 | Grand Trunk | 95 | 35 |
| 1 | B. R. & P. | 47 | 23 |
| 1 | B. R. & P. | 55 | 50 |
| 1 | G. T.—H. L.—D. & B. | 75 | 30 |
| | Waste to balance | | 145 |
| 34 | **Total** | 1,946 | 1,354 |
| 31 | **Previous week's report** | 1,916 | 1,384 |
| 65 | **Grand Total** | 3,862 | 2,738 |
| | **Average per load** | 59 | 42 |
| | **Average per delivery and pick-up load, 2 weeks** | 66.5 | |
| | **Average cost of 65 loads at $45 per week** | $1.38 | |

the explanation was made, the conditions which had impeded the conduct of the business of both concerns were improved, with the result that both profited and relations were established on a more cordial basis.

Primarily, the Barcalo company experimented with motor trucks back in the pioneering days, because it believed that they would do the work more cheaply. It was the vindication of this theory by the showing of the first trucks that led to the continual additions to the fleet until today the horse equipment has been displaced entirely.

## He Cuts Idle Truck Time

(Continued from page 11)

already been run on the above strenuous schedule for more than 2 months and have not yet been out of service.

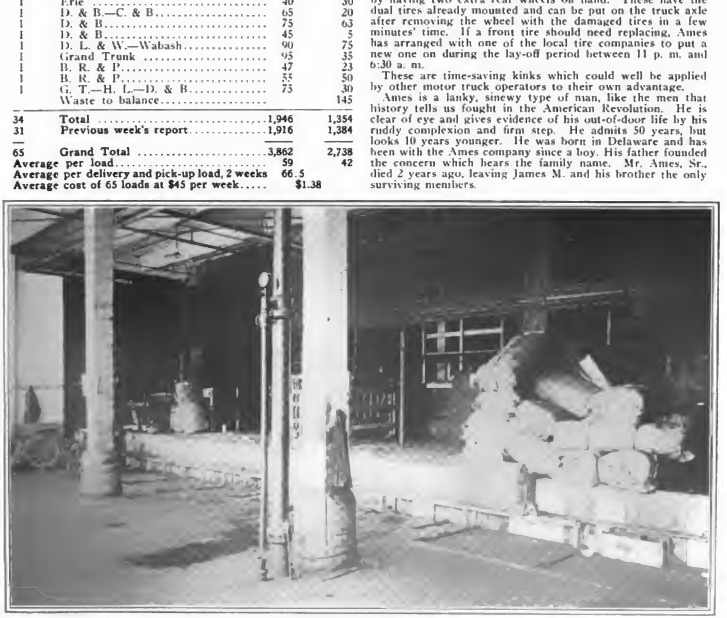
This record is due to the good care which these trucks receive. The care is administered by one expert mechanic at the garage, aided by two others, one to wash and the other to grease the vehicles. Each truck is inspected minutely every night by the chief mechanic. The motor oil is changed every other night, a brand new supply being used. All of the grease cups are filled every night and the gearbox grease is renewed at short intervals.

The drivers work continuously during the entire 8 hours, snatching their lunch during the loading periods. This enables the usual idle lunch time to be eliminated.

No time is lost due to tire troubles. This is accomplished by having two extra rear wheels on hand. These have the dual tires already mounted and can be put on the truck axle after removing the wheel with the damaged tires in a few minutes' time. If a front tire should need replacing, Ames has arranged with one of the local tire companies to put a new one on during the lay-off period between 11 p. m. and 6:30 a. m.

These are time-saving kinks which could well be applied by other motor truck operators to their own advantage.

Ames is a lanky, sinewy type of man, like the men that history tells us fought in the American Revolution. He is clear of eye and gives evidence of his out-of-door life by his ruddy complexion and firm step. He admits 50 years, but looks 10 years younger. He was born in Delaware and has been with the Ames company since a boy. His father founded the concern which bears the family name. Mr. Ames, Sr., died 2 years ago, leaving James M. and his brother the only surviving members.



Interior of the Barcalo loading bay. Note bun per for wheels, next to loading platform and motorcycles ready for a hurry call for a road repair

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# Kansas City Trucks Lead a Strenuous Life

## Sparsely-built-up Kansas City, With 700 Hills Covering 75 Square Miles Has Problems of Its Own for Motor Trucks

By George E. Quinsenberry

LOCAL CONDITIONS are the meter by which truck requirements must be measured if truck success is to be attained. The mistake on the part of both buyer and seller of selecting vehicles from the showing which they have made in other applications with different local conditions can, and sometimes does result in the selection of totally-unsuitable equipment.

Pittsburgh and Kansas City differ chiefly from other cities of similar size in that they are the two most hilly in the country, but even as between these two, there are differences, and one might go far wrong in applying the experience gained in Pittsburgh to conditions in the Southwest metropolis. This difference is mainly in the density of population and the better road conditions prevailing. Kansas City requires vehicles of light weight and good speed.

### Light, Speedy and Durable

A problem of great comparative consequence in connection with the successful operation of the large dry goods stores and department houses in Kansas City has been that of obtaining motor vehicles of light weight and durability that will meet the requirements for efficient and speedy service. Ordinarily one not informed or experienced would think this was a problem of simple and easy solution, but in Kansas City at least this is not the case, whatever may be the truth elsewhere under more favorable physical conditions.

Kansas City and its suburbs, comprising the city's retail trade territory, include upwards of 250 square miles of hills and hollows, about 50 miles of winding rivers and many hundreds of miles of streets and highways, paved and unpaved, good and bad. This means that the vehicle delivery situation here is exceptional by the same token that the transportation problem is exceptional. Kansas City has been called a city of seven hundred hills, and while an exact census of its high spots may not precisely tally with this characterization the disadvantage of up-grade and adverse highway conditions is quite apparent.

### Per-mile Population Low

With an estimated population of a little less than half a million, Greater Kansas City, including the city on the Kansas side of the river and Rosedale, has an area of about 75 square miles. That makes the average population per square mile 6,600 here as compared with 12,719 in Philadelphia, 17,734 in Boston, 12,292 in St. Louis, 12,535 in Chicago, 10,869 in San Francisco, 17,391 in Newark, 13,347 in Pittsburgh, and 14,987 in Detroit. Some other cities, such as Denver, present the same grade problems that this city presents, but most other cities of this kind have a more compact population. The city lay-out shows a length from north to south of 8½ miles. In this city proper there are over 400 miles of street, though it is a happy mitigative condition that a quite unusual proportion of this gross length is paved.

The significance of these facts in connection with the vehicle delivery problem is that the machine to fill the requirement must be good and well-built. A cheap, unsubstantial car does not economically serve the purpose. Practically all the big stores of the city have been using motor trucks either to replace or supplement horse vehicles, but the operation of both electric and gasoline vehicles up to this time has been more or less experimental. Though the gradual increase of commercial vehicles in this service seems to indicate a trend of judgment in their favor, there is as yet a difference of opinion as to their full utility. Some of the large concerns, however, are quite enthusiastic about motor delivery and base their enthusiasm on facts that have developed in the course of their experience.

"Our one great trouble is to get the kind of truck that is not too heavy, and one that will give plenty of speed, combined with a capacity for carrying a small load," said the manager of the John Taylor Dry Goods Co.'s delivery service. "We started 5 years ago with a two-cylinder Maxwell car. It did very satisfactory service as long as there were only a few bundles in the load to be delivered, but our service called for something different—something of a compromise between a motor truck and a fast passenger car. As a result of our experiments we are gradually getting the sort of vehicle our delivery service demands.

"The John Taylor company now has in service six Detroit electrics, with 60-cell A-4 Edison batteries, besides two Studebaker 1,500-pound gasoline trucks. The electrics are used to make two deliveries daily in the city territory—say between Twenty-fifth and Forty-eighth streets, a zone with a ¾-mile radius, and the gasoline trucks are covering the suburbs outside of the zone covered by the electrics.

### Horses for Short Hauls

"Inside of the zone covered by the electrics, or within a radius of fifteen to twenty blocks from the store, twelve horse wagons with eighteen head of horses are used.

"We find it a great advantage to use

One of the 1,500-pound Whites of the Emery, Bird, Thayer Dry Goods Co., Kansas City

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One of Duff & Repp's electrics which bring the rural districts into close shopping touch with the city

the electrics for the reason that there is no waste of time in getting out onto the routes and back again, as there would be if the extra distance had to be covered by horses. Of course, the loads of an exclusive dry goods house are not as heavy as are the delivery loads of some other mercantile concerns, and our electrics travel over hills and hollows and cover their routes handily. The gasoline trucks are especially adapted to the long runs to the suburbs and they are a splendid aid to us in taking care of our suburban trade. We still use horses. In fact, we have renewed our equipment with the building of our new store, for we find them especially useful for inside delivery. Then, too, there are some places where the streets are rough and bad and in such places it is not good policy to send an expensive motor vehicle."

### Cost of Operation

The cost of operating these electrics and gasoline machines in Kansas City, based on last year's business, was approximately $500 each for the electrics and $750 each for the two gasoline machines. This cost includes the expense of electric current and gasoline, lubrication, repairs and all other items entering into the upkeep of the vehicles, but it does not include the wages of drivers, insurance, interest or depreciation. When it is considered that the gasoline cars covered a distance of 60 miles a day on the average of 300 days, a total of 18,000 miles for each car, and the electrics covered an average of 35 miles each a day for the same period, a total of 10,500 miles for the year, there appears to be a shade of difference in favor of the gasoline vehicles.

Probably the largest user of the delivery vehicle in the city is the Burgher Package Delivery Co., which distributes merchandise for a great many of the retail concerns. This company has eighteen gasoline trucks, fifty-seven horse vehicles and twelve motorcycles. Mr. Burgher, the president and general manager, did not hesitate to say that the company made its profit on the horse vehicles, but he admitted that the company could not get along without its motor cars for outside delivery and that it had added five during the past year and would add more. He had tried very hard to find out which machine was most serviceable, best combining the conflicting qualities of lightness and durability, but he found it difficult because of the varying competency of drivers and mechanicians to determine. He regarded the average cost of upkeep as a determining factor. Mr. Burgher had used electrics but did not regard them as practicable for a city of Kansas City's physical situation.

There are four Studebakers each of 1,000 pounds capacity, one Great Smith of 1,500 pounds capacity, two Jacksons of 1,000 pounds capacity, two Buicks of 1,000 pounds capacity, two G. M. C. trucks of 3,000 pounds capacity and seven Fords of 800 pounds capacity. The motorcycles are equipped with sacks instead of boxes.

The Emery-Bird-Thayer Co. operates seven gasoline machines—one Pierce-Arrow rebuilt touring car chassis with a parcel body, two Velies of 1,500 pounds capacity, and four 1,500-pound Whites—and fifty-five horse vehicles. The superintendent of delivery said the cost of operating the gasoline machines, for the same amount of delivery, was about 25 per cent greater than that of the horse vehicles, but he regarded the motor cars as a necessity for outside delivery and the company was increasing them on the basis of efficiency and not economy. He thought there was plenty of room for improvement in gasoline delivery vehicles in a better combination of speed and strength for cities like Kansas City. He did not believe in the electric.

It is the view of most of the business men of Kansas City who use delivery wagons that the horse vehicle will not at once be replaced here for short deliveries, since its service is materially cheaper. The motor car, on the other hand, must be used continually and increasingly for outside deliveries. There is a wide difference of opinion as to the economical utility of the light electric car for delivery purposes.

### Occupy Separate Fields

No comparison can fairly be made say between the motor vehicle service and the horse vehicle service for the reason that, in this city at least, they fill separate fields and each is best and necessary in its field. The managers of the delivery departments in the big stores generally agree, however, that with the right kind of a truck a much larger portion of Kansas City territory can and eventually will be served with motor delivery, both economically and efficiently.

But while the dry goods and department stores are calling for light and speedy motor vehicles of assured durability for the distribution of merchandise, the furniture houses and stores handling heavy merchandise in Kansas City are reaping the benefit of a largely

(Continued on page 28)

Group of Detroit Electrics, delivering for John Taylor Dry Goods Co., Kansas City. The company has six

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# Roads, Their Influence Upon Economic and Social Conditions

## Investment in Good Country Roads Yields Dividends in Agricultural Prosperity and Superior Education

CIVILIZATION, since history began, has been measured by the kind of roads a people built. Commerce, science, art, literature and education are all dependent upon transportation primarily. The greater portion of the population of the world resides in rural or semi-rural regions. So the gospel of good roads is an old issue, one of the oldest in the memory of man, yet ever a new one and the need for good roads is ever present.

S. M. Williams, sales manager of the Garford Motor Truck Co., is an active preacher of the good roads gospel and has prepared a treatise. On these pages are shown some of the illustrations used in Mr. Williams's book and his essay follows:

The public is gradually awakening to the importance of permanent road construction, but with only 10 per cent of the public roads in the United States improved, and many states with less than 5 per cent of improved roads, we are still in the land of mud. Many sections of the country are opposing road improvement, because of a lack of understanding of its value to their own communities.

### Paving Is Good Business

There was a time when towns were satisfied with board walks and stepping stones for street crossings. Paved streets were not considered, but today competition between cities and towns demands paved streets and walks.

In rural communities, 1 day in the week was set aside from farm duties for going to town. The farmer was satisfied to drive through the mud and over the rough roads. Unfortunately, in many sections, they continue to be satisfied with such road conditions, but in other sections, the farmer knows better. He is demanding the same advantages enjoyed by his competitors in other sections, and due to the building of good roads.

The urban population complains of the high cost of produce. The farmer complains of the high cost of marketing the products, all due to bad road conditions, but what is accomplished, or even attempted, to remedy the trouble? Those in towns and cities say, "We should not be required to build roads for the farmer," and the farmer continues to be satisfied with the hardships of the bad roads, causing a very low efficiency in the earning ability and a rapid depreciation of his teams. In such communities, both the urban and rural populations are paying many times the cost of road improvements without securing them.

### Roads and the Planter

In one county of Tennessee, before road improvement began, one bale of cotton was an average load for a two-horse team. There are now 100 miles of improved roads in that county, and twelve bales is not an uncommon load, thereby increasing the earning ability of the team for the farmer twelve times. Some time ago, the farmers were notified by telephone of a sudden rise of $4 per bale in the price of cotton. To the farmer living upon the bad road, who could only haul one bale, the rise in price only meant a profit of $4 per load, but to the farmer living upon the good road, it meant a profit of $48 per load, and he was able to haul the twelve bales the same distance in less time and with less abuse to his team and wagon.

In another county of Tennessee, the cost of delivering wheat from farm to railroad, a distance of 10 miles, was reduced from 15 cents to 4 cents per bushel after the roads were improved.

Careful investigation and comparison in the showing of the farmers and other teams before and after road improvement, disclose some remarkable results. In one case, an increase of 380, and another of 283 per cent. Compare and consider this profit for the farmer with his small proportion of the road improvement cost.

Showing the influence of road improvement upon the volume of production and traffic, one county in the South spent $100,000 in 5 years in building permanent roads, and within 2 years after the road improvement began the annual tonnage over the roads in agricultural

A contrast—Left, an abandoned farm in New Hampshire; right, a prosperous farm in New Jersey. Note the difference in the kinds of roads and some idea of the reason for success or failure will be obtained

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and forest products increased about 45 per cent. The dairy and poultry products showed an increase of practically 140 per cent. Careful investigation showed that the increased tonnage and decreased cost of hauling over the improved roads showed a clear yearly profit of $41,000, more than 41 per cent of the entire cost of the road improvement.

Upon one road alone, a distance of 12 miles, the expenditure for road improvement was $28,000 and the saving in the cost of hauling was estimated to be fully $14,000 per year, or 50 per cent of the total expenditure.

It is a well established fact that market prices vary considerably throughout the year.

Above, isolation and poverty, due to bad roads; left, note the effect of a good road upon farm buildings and fences

With the unreliable road conditions in many sections of the United States, farmers are forced to move their crops, no. when the market prices are most favorable, but when the roads will permit.

The United States Department of Agriculture estimates that the farmers of the United States are losing annually $250,000,000 on account of the inaccessibility of their products at certain times of the year, due to bad road conditions.

Investigation shows that there are many counties rich in agricultural products, but burdened with bad roads, where the annual incoming shipments greatly exceed the outgoing.

### Roads and Famine

With improved roads such counties could not only be self-supporting, but could ship products to other markets. Several years ago, the price of potatoes in a certain town went as high as $1.40 per bushel. The farmers in surrounding territory had quantities of potatoes on hand, but could not get them to market on account of bad roads. While the roads continued in such condition, as many as 10 carloads of produce, including potatoes, wheat and other supplies, were shipped in to feed the town.

It is a matter of common observation that where any community passes from a condition dominated by bad roads, to one characterized by good roads, land values in that community advance. Prior to any road improvement in one county of Alabama, the average price of land was from $6 to $15 per acre. After 24 per cent of the roads were improved the value of land increased to $15 and $25 per acre.

The United States Office of Public Roads refers to a farm in Virginia of 100 acres which was offered for sale at $1,800. Later the roads upon which the farm was located was improved, and although the farmer fought the road improvement, he has since refused $3,000 for the farm.

Another tract of 180 acres along the same road was supposed to have been sold for $6,000. The purchaser refused the contract, but later, after the road improvement and without any improvement upon the land, he paid $9,000 for the same tract. It is true that road improvement will not improve the fertility or quality of the farm, but it is also true that good roads will improve the site value in its relation to markets, schools and towns.

The Bonita road near Meridian, Miss., before and after improvement, taken from the same point. Note the house to the left in both pictures, its fence and the new telephone line. To the right, in the lower picture, is a new house, built since the road improvement

### Haulage Cost Reduced

Hard-surfaced roads reduce the cost of delivery between farm and market.

Recently a governor of one of our important states contended that a team of horses would draw more upon a dirt road than upon a hard surfaced road, when in reality a team will draw, upon a good gravel road, five times more than through sand or mud, and ten times more upon good macadam.

One of the states having only 4 per cent of permanent improved or surfaced roads within its borders has one of the best systems of dirt roads in the country, due in part to the favorable

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soil in portions of the state, and for about three-fourths of the year, a favorable climate; also to the interest shown by the farmers in dragging and otherwise keeping up the dirt roads, but notwithstanding these facts, this state engineering department estimates it is costing their farmers about $11,000,000 per year to move their surplus product from farm to railroad. They also estimate that 10 per cent of the roads carry fully 75 per cent of the total traffic.

If the 10 per cent were improved, and the cost of transportation reduced only one-third, it would mean a saving of from $3,000,000 to $3,500,000—a substantial increase in profits to their farmers, but notwithstanding these facts, the state legislature has so far stood against the farmers by blocking good road legislation.

**What $3,000,000 Would Do**

Three millions of dollars would go a long ways toward paying for the permanent improvement of these heavy-traffic roads.

Road improvements increase the possibilities of the markets by increasing the area from which they may draw their supplies.

We who live in towns often fail to realize the influence of road conditions upon the social life of rural communities.

It is only fair to say that the National Congress of Mothers and Parent Teachers' Assn., with its branches in forty states of the union, is wielding a powerful influence for good roads.

They believe that the wife of the farmer of moderate means, who rises at 4:00 to 5:00 in the morning, does her own cooking, washing, ironing and sewing, should be assisted in finding ways and means for intellectual improvement, in order that she may bring up her family of boys and girls to be useful members of society.

A farmer whose wife had recently been committed to an asylum, in discussing the matter with his physician, said: "I do not know what made my wife go insane; she had nothing to bother her; she has lived in a quiet place. Why, she has not been out of the kitchen hardly for 18 years."

Experts have found that insanity is a social conditions with a distinct relation to good roads. Two states were recently astounded by a report of an investigation made, within their borders, as to the cause of insanity. In both states, the road conditions were miserable and it was found that a large percentage of the insane were the wives and daughters of the farmers where there was little or no opportunity for social intercommunication, but whose lives were of monotony and loneliness, due to isolation on account of miserable road conditions.

The building of good roads will relieve the isolation of these rural districts and give the inhabitants opportunity for a larger socialization, which will eventually result in eliminating the unfortunate and pitiable conditions.

Poor roads mean illiteracy or worse.

In 1909, the percentage of improved roads in the New England states was 22.2 per cent, and the percentage of illiteracy was only 1.7 per cent.

In the south Atlantic states, the percentage of improved roads was only 6.7 per cent and illiteracy 12 per cent. The excess of illiteracy in rural over urban population, due to a lower percentage of improved roads showed for the south Atlantic states, 40 per cent, and 140 per cent for the New England states. In both of these comparisons, only native whites of native parentage, were considered. The percentage of illiteracy among the urban white population is estimated to be only 9 10 per cent; rural illiteracy among the same class of inhabitants is 600 per cent greater, and due to the influence of bad roads upon the school and social lines of the rural population. Bad road conditions inflict hardship upon the one-room district school.

During much of the school term a considerable part of the 2,000,000 miles of our public roads is impassable.

Consequently, of the 30,000,000 or more children in the United States who would attend school, only 18,000,000 are attempting to do so. It is common practice to keep the children at home on account of bad roads, and frequently the average small attendance is so greatly reduced that the efficiency of the one-room school is materially affected. The question of the relations between road conditions and the rural schools is one that should be carefully studied.

Fortunately some rural communities are beginning to awaken to its importance and are apparently more willing to support better schools and to support the building of good roads, so as to permit the consolidation of the one-room schools into a large, graded school, and to permit the carrying of scholars to and from their homes at public expense with the use of the school wagon.

**The Consolidated School**

The Consolidated School is also becoming the social and intellectual center of communities, the gathering place for public meetings of all kinds; and frequently the school wagons are pressed into service for hauling the farmers to and from the meetings.

The maintenance of the Consolidated Schools, with the transfer of the scholars to and from the schools, does not cost any more than the numerous one-room schools, and it does offer greater educational and social opportunities.

There is also a marked tendency for property owners to improve the appearance and surroundings of their homes and buildings as the roads upon which they are located are improved. You find no abandoned farms upon good roads.

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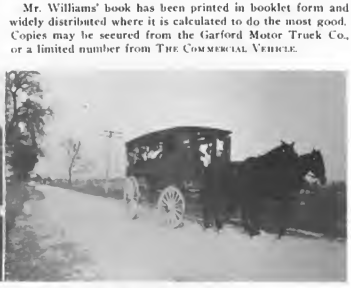
Mr. Williams' book has been printed in booklet form and widely distributed where it is calculated to do the most good. Copies may be secured from the Garford Motor Truck Co., or a limited number from THE COMMERCIAL VEHICLE.



Why good roads decrease illiteracy—To the left, the sort of children who attend school only part of the year and seldom progress beyond the seventh grade; to the right, a school wagon near Butterworth, Va., gathering children for consolidated school

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A road freight car. Harford Transportation Co.'s 5-ton Saurer on long-distance country express run

## POSTAL TRUCK BIDS ALL OPENED

(Continued from page 15)

troit, class B, $1,340.90; $1,337.39; $1,340.90; $2,336.90.

Touraine Co., Philadelphia, Pa., f. o. b. Philadelphia, class A, four bids at $835; $865.

Mais Motor Truck Co., Indianapolis, f. o. b. Indianapolis; class D, $2,550; $2,515; $2,550; $2,500; class DD, same prices as class D; class F, $3,050; $3,025; class FF, same prices as class F.

Packard Motor Car Co., Detroit, f. o. b. Detroit; class D, $2,712.50; $2,682.50; $2,742.50; $2,682.50; $2,707.50; class DD, $2,722.50; $2,692.50; $2,752.50; $2,692.50; $2,717.50; class F, $3,645; $3,503.85; class FF, $3,645; $3,503.

Kelly Springfield Truck Co., Springfield, O., class D, $1,895; $1,900; $1,925; $1,950; $1,875; $1,900; class DD, same prices as class D; class F, $3,050; $3,000; class FF, $3,125; $3,075.

Four Wheel Drive Auto Co., Clintonville, Wis., class F, $4,400 and $4,350, both less 20 per cent; class FF, same prices as class F, with same discount.

White Co., Cleveland; class B, $1,970; $1,970; $1,965; $1,970; $1,970; $1,958; class D, $2,720; $2,705; $2,720; $2,708; $2,720; $2,720; class DD, same prices as class D; class F, $3,315; $3,303; class FF, same prices as class F.

Thos. B. Jeffery Co., Kenosha, Wis.; class D, $2,785; $2,760; $2,760; $2,750; $2,700; $2,860; class DD, same prices as class D; class F, $3,900; $3,890; class FF, same prices as class F.

Locomobile Co. of America, Bridgeport, Conn.; class F, $4,022.50; $3,950; class FF, same prices as class F.

Borris Motor Car Co., St. Louis; class B, four bids at $1,885; $1,860; $1,845.

Couple-Gear Freight Wheel Co., Grand Rapids, Mich., f. o. b. Grand Rapids; class F, $4,000; $4,000; class FF, same prices as class F.

Standard Motor Truck Co., Detroit, f. o. b. Detroit; class B, $1,885; $1,850; $1,875; $1,850; $1,830; class DD, same prices as class D; class F, $2,480; $2,450; class FF, same prices as class F.

General Motors Truck Co., Pontiac, Mich.; class B, $1,250; $1,295; $1,250; $1,275; $1,250; class D, $2,045; $2,000; $2,025; $2,000; $2,000; $2,125; class DD, same prices as class D.

Sterling Motor Truck Co., Milwaukee, f. o. b. Washington or New York; class B, $1,050; $1,040; $1,075; $1,050; $1,080; $1,050; class F, $3,150; $3,100; class FF, $3,300; $3,270.

Denby Motor Truck Co., Detroit, f. o. b. Detroit; class B, $1,025; $1,100; $1,075; $1,101; $1,135; class D, $1,690; $1,665; $1,700; $1,665; $1,665; $1,725; class DD, $1,690; $1,665; $1,725; $1,690; $1,690; $1,740.

Avery Co., Peoria, Ill.; class FF, $2,500; $2,480.

Jos. W. Moon Buggy Co., St. Louis, f. o. b. St. Louis; class D, $1,650; $1,620; class DD, $1,675; $1,645.

C. L. Barker, Norwalk, Conn.; class B, $1,565; $1,540; $1,565; $1,540; class DD, $1,575; $1,550; $1,575; $1,550.

Sandow Truck Co., Chicago; class D, chassis only, $1,625; with body, $1,920; $1,875; $1,905; $1,875; $1,875; $1,900; class DD, chassis only, $1,625; with body, $1,935; $1,890; $1,920; $1,890; $1,890; $1,915; class F, chassis only, $2,565; with body, $2,945; $2,915; class FF, chassis only, $2,555; with body, $2,935; $2,905.

Corbitt Auto Co., Henderson, N. C.; class D, $2,050; $2,000; $2,025; $2,000; $2,075; $2,000; $1,950.

Bauistrum Co., Battle Creek, Mich.; class A, $1,285; $1,283; $1,285; $1,277; class B, $1,375; $1,373; $1,375; $1,363.

Beck & Son, Cedar Rapids, Iowa; class B, $1,200; $1,175.

Service Motor Truck Co., Wabash, Ind., f. o. b. Washington; class B, $1,492; $1,468; class D, $2,068; class DD, $2,100; class F, $2,744; class FF, same price as class F.

Gabriel Auto Co., Cleveland, O., f. o. b. Cleveland; class B, $1,700; $1,690; $1,700; $1,675; $1,735; $1,700; class D, $2,200; $2,175; $2,235; $2,200; $2,200; $2,200; class DD, same prices as class D.

Federal Motor Truck Co., Detroit, f. o. b. Detroit; class D, $2,090; $2,070; $2,107.50; $2,090; $2,090; $2,090; class DD, same prices as class D.

## Good Roads Better Than Rails

CONCRETE evidence of the value of good roads is offered by the haulage enterprises which spring up wherever good roads on main routes of intercourse are maintained.

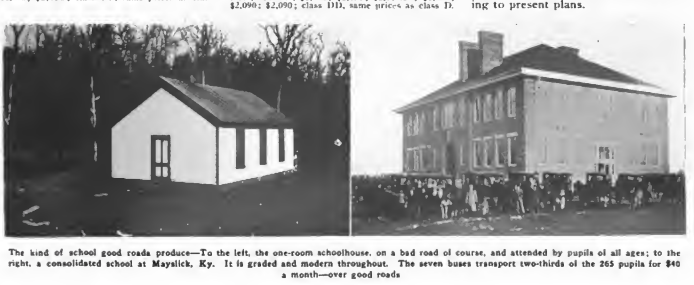
Railroads cannot compete, either from a standpoint of service or price, with the motor truck where good roads abound between cities, except on the longer hauls, which of course the motor truck does not often attempt. Furniture movers, perhaps, make a profit on longer hauls than any other class of truck users. But other than these, general haulage companies are finding a fertile field in freight service between main centers and tributary cities, whether served by railroads or not.

Havre de Grace, Md., is 44 miles from Baltimore, Md., over the roads and about 40 by rail. It is located on the Susquehanna river, at one of the only two road bridges over that stream. It is on the main route between Philadelphia, Wilmington, Baltimore and Washington, on the main line of the Baltimore & Ohio railroad.

The Harford Transportation Co. has installed a 5-ton Saurer on the route between Havre de Grace and Baltimore, in daily service. Along the route are several important communities, all of which provide a great amount of traffic for the new line. One round trip per day is easily negotiated and the chassis is equipped with a body especially adapted to such service.

Roads between these points are among the finest in the country and are favorites with motor tourists. Overlea, Perry Hall, Kingsville, Benson, Bel Air, Fountain Green, Fulford, Churchville, Carsins Run and Aberdeen are the cities along the main Blue Book route which are served by the new line.

The truck is provided with a large rack body, set low on the chassis frame with cut-unders for the rear wheels. It has a fully-inclosed cab and a large electric searchlight for use at night. The line will be operated the year 'round, according to present plans.



The kind of school good roads produce—To the left, the one-room schoolhouse, on a bad road of course, and attended by pupils of all ages; to the right, a consolidated school at Maysick, Ky. It is graded and modern throughout. The seven buses transport two-thirds of the 265 pupils for $40 a month—over good roads

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Clever arrangement of shelves which facilitates footwear delivery

# Special Shoe Body Saves Time

THE BOSTON SHOE CO., one of the leading retail houses of Louisville, Ky., has worked out a plan by means of which the service given by its Ford delivery car has been greatly increased. It involves the division of the body into compartments, enabling the packages to be arranged according to the location of the customers, thus saving the time which is usually lost when it is necessary to hunt among the parcels for the right one, and also obviating the necessity of making out a list.

### Sectional Bookcase Idea

The body was made by Peter M. Andriott & Sons, of Louisville. It has three shelves, dividing it into four horizontal sections, capable of holding 125 pairs of shoes. The sections are high enough to take two pairs of shoes, and yet are small enough to indicate the section of the city which is to be reached in the deliveries.

The Boston company originally used the services of a parcel delivery concern, which operates a large fleet of motor cars, but owing to the size of its business and the necessity of giving better service to its customers, it finally decided to put in its own delivery system.

The ends of the special body are solid, except for a tail-gate which opens into a small chamber in which extra tires are kept. The doors of the body are on the sides. Double doors are used and are provided on both sides, so that the door nearest the curb can be opened. The doors are locked with a heavy key, which serves as key and handle at the same time, and there is little opportunity for the sneak-thief to get into the compartments. In fact, the pilfer-proof character of the body, as compared with some others, commends it.

As the running-board projects back far enough to enable the helper to open the door while the car is moving, he usually has secured his package and is ready to make his dash into the customer's house by the time the machine has been brought to a stop.

The shelves extend all the way across the body and are 5 by 4 feet in dimensions. They are flat and spaced at equal distances so as to take the shoes comfortably and prevent their sliding about. It is possible that a shelf which inclined somewhat toward the center would hold the boxes more securely, but the present arrangement has been found to be quite satisfactory.

Everything sent out of the store goes in boxes, to assist in the general scheme, most stores taking the shoes out of the packages when they are delivered. The use of the box assists handling, and also keeps the address ticket, which is pasted on the end, in plain sight, so that there is a considerable advantage to be gained in this way.

### Routing Automatic

As soon as the boxes are turned over to the deliveryman and his helper, they are speedily sorted and arranged in the shelves according to locations. After that the packages automatically present themselves when they are wanted, and as each is delivered, the boy has only to look beyond it to see where the next stop is to be.

This saves time in making up a list, in getting the parcels out for delivery when the destination is reached, and at every step of the way. The car has been making three trips and averaging about 60 miles a day.

## KANSAS CITY TRUCKS

(Continued from page 23)

increased trade on account of the splendid delivery service by heavy motor trucks. In fact, modern motor trucks are rapidly displacing the old delivery wagons and horse-drawn vans, and the area of territory reached by what is known as city delivery has been vastly enlarged.

As an indication of the use to which the modern motor truck is employed in Kansas City, the case of the Duff & Repp Furniture Co., one of the largest houses in the Southwest, is cited. Five years ago this company, because of the difficulty of serving its patrons with prompt and efficient delivery service, placed one heavy motor truck of 5-ton capacity into service. The result of the operation of this truck was so satisfactory that soon another truck was purchased, then another and another, until now the company has six trucks in its regular delivery service.

So efficient was this motor truck service that the company did another unheard-of thing. It extended the territory so that city delivery was made to embrace everything within a radius of 20 miles of the company's store. Now it is not necessary for a customer living within this zone to have his goods packed and shipped by freight. The motor truck whirls them out and they are placed in the customer's house in good condition. A few days ago a young couple of newlyweds came into the city and purchased furniture and household goods in the morning. That afternoon the goods went out by motor truck without extra cost or annoyance and that evening the happy couple set up housekeeping.

Of course, not all the furniture houses are doing that, but they are coming to it; they are being forced to it by competition. It is a delivery service that is appreciated by the patrons and means increased business, not to mention good advertising. In this case it extends to practically every point in three counties of Missouri and three in Kansas, giving the people the same delivery of merchandise as is enjoyed by those who reside in the heart of the city.

"The motor truck delivery is more reliable, much quicker, and it costs us less money," the manager of the Duff & Repp service said. "We would not think of going back to the old horse vehicle service. It would be folly to think of such a thing, for with the rapid growth of our city and our business we could not handle the trade by any other method than motor truck delivery. The country roads are not always good and many of the streets are in bad condition, but good roads and bad roads and bad streets, up hill and down hill, our motor trucks make their way."

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## A DOZEN TRAILER MAKERS

### Truck Makers Also Build Special Trailing Vehicles

To the Editor, COMMERCIAL VEHICLE: Will you please give me the names and addresses of companies that manufacture trailers?—William J. Hudson, Detroit.

Following are twelve makers of trailers for the general market. In addition to these there are several truck makers who supply trailers of their own manufacture for their products:

Campbell Mfg. Co., Jackson, Mich.
Columbia Motor Truck & Trailer Co., Kalamazoo, Mich.
Detroit Trailer Co., Detroit.
Dunkley Co., Kalamazoo, Mich.
Eagle Wagon Wks., Auburn, N. Y.
Laura, John F., Coldwater, Mich.
Lion Buggy Co., Cincinnati, O.
Studholt Mfg. Co., Brooklyn, N. Y.
Simplex Short-turn Gear Co., Anderson, Ind.
Troy Wagon Wks. Co., Troy, O.
Variety Mfg. Co., Chicago.
Watson Wagon Co., Canastota, N. Y.

## TRUCK COST ARTICLES

### Systems and Figures Relative to Operating Expense

To the Editor, COMMERCIAL VEHICLE: I am interested in securing some statistics on the cost of operating gasoline and electric motor trucks. It occurs to me that THE COMMERCIAL VEHICLE may have published an article or two on this question. If so, if you have any information or know of any articles that have appeared on this subject, please give me references to them.—John B. Swinney, assistant secretary, Alexander Hamilton Institute, New York City.

THE COMMERCIAL VEHICLE has published many articles on the subject of motor truck costs and allied topics, but without detailed information on the particular service you have in mind and the conditions surrounding it, would not recommend any figures so far published, for all figures published in THE COMMERCIAL VEHICLE have a bearing on some particular installation. Average figures or estimates have little value except as a means of estimating requirements, and are usually very misleading when a particular commercial vehicle application is in mind.

Within the last year the following articles have been published relative to electric and gasoline truck costs and accounting systems for commercial vehicles:

August 1, 1914, page 6—Cost of operating a 5 ton White in garbage collection in New York City.

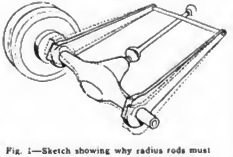

Fig. 1—Sketch showing why radius rods must be free to turn on the axle

December 1, 1914, page 24—Cost of operating a Jeffery 2-ton four-wheel-driven truck and trailers in contracting work, Kenosha, Wis.

February 15, 1915, page 9—Cost of operating 2-ton Autocar in coal delivery, Philadelphia, Pa.

March 1, 1915, page 33—Representative figures from different lines of industry supplied a reader in this department.

May 1, 1915, page 29—Revision of above mentioned Jeffery figures to conform with recent changes in tire list prices, showing the important bearing of tire prices on truck operating costs.

June 15, 1915, page 25—Partial costs of operating White tractor-truck in road work and in connection with trailers.

July 1, 1915, page 12—Digest of a paper read at the recent convention of the National Electric Light Assn. in San Francisco, giving so-called average figures on electric truck costs.

September 1, 1914, page 5—Description and reproduction of forms in THE COMMERCIAL VEHICLE'S standard cost system for motor trucks.

December 1, 1914, page 12—"Why and Wherefore of Truck Accounting," a paper on the above cost system read before the Motor Truck Club of America.

April 15, 1915, page 20—Article on the ton-mile, a unit of measurement for truck performance.

These, of course, are only several out of many articles on the subject which have been printed.

## FRENCH TRACTOR MAKERS

### Names and Addresses of Makers of All-drive French Tractors

To the Editor, COMMERCIAL VEHICLE: Kindly supply me with the addresses and manufacturers' names of four-wheel-driven tractors in France.—Alert, New York City.

There are four principal makes of tractors made in France, or were before the outbreak of the war. They are:

| Tractor. | Maker. | Address. |
|---|---|---|
| Latil | Charles Blum. | Levallois, France. |
| Schneider | Schneider et Cie., | 28 Avenue Footlame-Argent, Besancon (Doubs), France. |
| Panhard | Panhard Chatillon | Cie., 19 Avenue d'Ivry, Paris, France. |
| Renault | Renault Freres, | 15 due Gustave Sarcher, Billancourt (Seine), France. |

## WHY THE TORQUE ARM?

### Why Radius Rods Cannot Be Used To Take Axle Torsion

To the Editor, COMMERCIAL VEHICLE: In your answer to M. Harris in the issue of September 1, 1915, you did not make one point clear. From your answer I inferred that radius rods were used for propulsion, but not for torque; why not, pray, if I may ask? Why put the additional complication of a torque member on a motor truck when you already have radius rods which might just as well serve a double purpose?—H. R. Du Sang, Springfield, Mass.

Radius rods will not do for propulsion owing to the fact that it is necessary for them to be free at their rear ends. If they were rigidly attached at the rear, as they would have to be in order to take the axle twist, they would either hold the rear axle at all times parallel with the frame or be bent or broken the first time the vehicle encountered uneven ground. This is illustrated in Fig. 1. The usual method with light trucks having radius rods is to let the springs take the torque, and on heavy trucks to fit a torsion member.

## MORE ABOUT THE RADIUS ROD

### Reader Thinks Radius Rod a Makeshift on All Shaft-driven Trucks

To the Editor, COMMERCIAL VEHICLE: I read with considerable interest your answer to Milton Harris, of Baltimore, in the September 1 issue, concerning torsion and propulsion and methods of taking them. I have some ideas on the subject myself and would like to air them, if possible, and receive your comments on my conclusions:

The radius rod is a makeshift. Necessary on chain-driven trucks to keep the sprocket centers the proper distance apart, they have no purpose whatever on shaft-driven vehicles. If springs stand up when used for propulsion, always granting that makers are willing to pay the price for good springs, what earthly use is there in putting on a pair of rigid steel bars when flexible connections are more desirable? To put a spring on the frame connection of a torsion arm or radius rod is the most eloquent kind of admission that the thing is fundamentally wrong.

Now that most of the makers have broken away from the chain, let them also abandon all the old chain-driven errors of the past, such as rigid frames and rigid axle connections to that frame. Let us have flexible frames, flat, flexible springs, shaft drive and no radius rods, torque members or complication.—H. C. Merrill, Cleveland.

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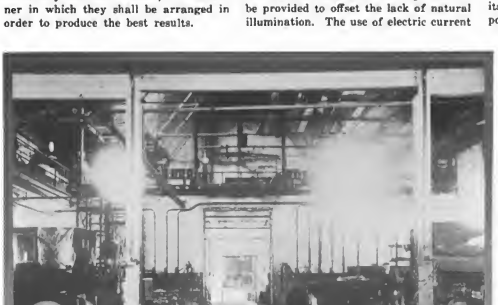
# Garage Shops Should Have Light and Ventilation

## Walls Should Be Painted White—Artificial Lighting Systems Should Have Light for Each Machine—Proper Ventilation Makes for Good Work

SHOPS in motor truck garages should be of sufficient size and equipped with a sufficient amount of the proper machinery and tools to perform all the necessary repair work. The first consideration in the lay-out of the shop after the number of pieces of machinery has been decided, is the manner in which they shall be arranged in order to produce the best results.



Above is shown the machine shop of the New York Edison Co.'s garage. The machines are located on the balcony at the rear. Note how the general lighting is supplied by arc lights suspended from the ceiling. Each piece of apparatus has its own drop light provided with a reflector

Light is one of the most necessary requisites of any shop, be it in a truck garage or in the largest manufacturing plant. Without proper light, the machine work done is liable to be faulty.

### Light an Important Requisite

It is a well-known psychological fact that men will do more work and do it better in a light and well-ventilated room than they will in a dark and stuffy one. Under adverse conditions the machinists are liable to slight work which under proper surroundings they would give the utmost care.

The type of construction of many garages does not permit the shop to be placed so that it obtains the proper amount of natural light. When such is the case, sufficient artificial light should be provided to offset the lack of natural illumination. The use of electric current for artificial lighting is almost universal.

This artificial lighting system should be arranged in such a manner that the units distribute the light in the proper places.

### Each Machine Should Have Own Light

Each piece of machinery should have its own light. This light should be so positioned as to illumine the piece of work being handled. The light may be suspended from the ceiling but should not be on the end of a long extension from a socket on the wall, as it would then interfere with the passage of men about the machine which it is intended to light.

### Extension Lights Convenient

Of course, electric lights on long extensions are very handy and often very necessary, for instance, in doing repair work on truck parts which can not be conveniently removed and carried to the workbench or machine. When used, extension lights should be attached to sockets as near the piece of work as is possible. There should be as many of these sockets as is practicable, and they should be located

One corner of the shop of the truck garage of the American and Westcott Express companies, showing type of portable crane used. In the foreground note type of engine stand in which the engine is bolted to a frame carried on trunnions. With the use of this device, the engine may be turned to the position in which the part being repaired is most accessible to the workman

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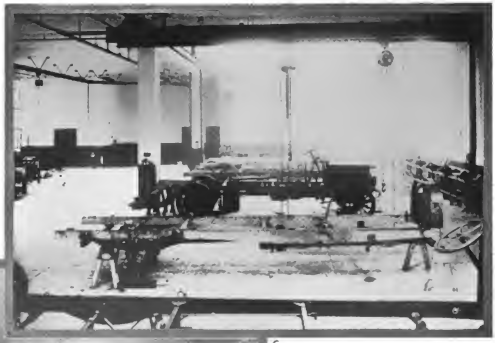
on the walls and columns in units of one, two or three each, according to the amount and kind of work for which the leads attached thereto are to supply the light.

### Lights Should Have Reflectors

When the electric lights are suspended from the ceiling on cords, they should be provided with suitable reflectors to throw the light on some predetermined area and to keep it from being diffused to other parts of the room, where its usefulness is negligible. One or two large clusters of lights on the ceiling are often used to supply the general light of the room and drop lights at each machine to supply the illumination necessary to do the work at each particular unit.



Above is shown the chassis-erecting shop of the Fifth Avenue Coach Co.'s garage. Note extreme lightness of room, electrically-driven crane and overhead telpher shown at the left

Garage of the Independent Garage Co., showing the location of the shop on a small balcony close to the roof, where the ventilation is poor. Note position of skylight in front of workbench instead of over it

This system of artificial lighting is shown in the upper illustration, page 30. This shows one corner of the electric garage of the New York Edison Co. The machine shop is located on the balcony at the rear of the building. The general lighting for the entire room is supplied by several arc lights suspended from the roof. The concentrated light required at each of the units of machinery is supplied from extension lights on the walls at the rear of the balcony.

### A Poorly-lighted Garage Shop

An example of a poorly-lighted shop is given in the illustration at the top of page 33. Here the electric lights are suspended from the ceiling at regular intervals but with no regard to the work to be performed at any given portion of the floor. The lights are too close to the floor, and not being protected by metal guards, are liable to be broken by coming in contact with pieces of material which the workmen may carry from one part of the room to the other.

The bulbs are not provided with reflectors, and accordingly the light is diffused in all directions and not confined upon the particular spot at which the work is to be done. The shop pictured is also provided with several extension lights attached to sockets on the walls, but when these are used they hinder workmen from passing from one portion of the shop to the other, because the sockets are too far away from the work.

This shop is on the ground floor of an old building in which the floors are closer together than usual. The body of the truck shown had to be removed before the chassis could be taken into the shop. This operation is a ridiculous waste of time and energy, but is unavoidable unless a shop be provided at some other site. As the company which owns the trucks also uses the remainder of the building as a furniture storage house, it is not possible to locate another shop in the same structure unless some of the storage space is given up. This they do not care to do.

### Entire Front of Shop Is Glass

An excellent example of a garage machine shop which receives a sufficient amount of natural light is that of the Fifth Avenue Coach Co., a view of which is shown at the top of page 32. The shop of this company is situated along the street side of the building. With the exception of sufficient pilasters to carry the superimposed weights of the floors above, the entire front side of the shop is glass.

The glass is held in metal frames, some of which are pivoted so that they may be swung in or out to provide sufficient ventilation. The work bench is located along the front side of the room, next to the windows. The various units of machinery are placed in rows farther back in the room, with wide aisles between each.

### No Artificial Light Required During Day

No artificial light whatever is required in this shop during the greater part of the day, but for night work or work during the short winter afternoons a system of artificial lighting has been installed. This consists of rows of lights suspended from the ceiling. These are located over the workbenches, down the aisles and at each of the larger machinery units. Each bulb is provided with a

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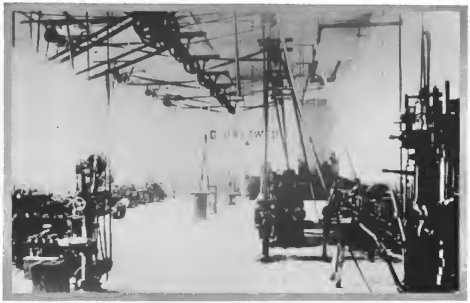

Machine shop of the garage of the Fifth Avenue Coach Co., showing extreme lightness of room, the entire front side of which is composed of steel sash and glass. Note position of workbench along the windows and lay-out of machines in two lines. Note also suspended lights with reflectors for each unit of machinery

reflector which throws the light downward over a desired area. This shop has an approximate floor area of 3,700 square feet and approximately 1,800 square feet of lighting area, or 1 square foot of lighting area to each 2 feet of floor space. This ratio is exceptionally large and was only made possible by the type of building construction used.

### Shop Floors Should Have Drains

Machine shop floors should be cement faced and drained so that they may be washed at regular intervals. The grade of the floor need only be sufficient to prevent the water from standing at any portion which may be slightly uneven. A grade of from 1/16 to ¼ inch to the foot is sufficient for the purpose. The floor may have a continuous grade from one end to the other, or may be divided into several sections, each provided with a drain at the lowest point.

### Shop Walls Should Be White

The color of the machine shop walls also has a great deal to do with the efficient lighting of the room. They should be painted white, as this color reflects light better than any other. The ceiling of the room should also be painted the same color or whitewashed.

A striking contrast between a shop having its walls and ceilings painted white and one which has not may be seen by comparing the two illustrations given at the top of this page and the page opposite. Although it is true in this comparison that each room does not receive the same amount of light, yet the almost complete absence of shadows in one and their preponderance in the other serve to indicate the desirability of painting the walls and ceiling white.

The amount of machinery to be used in a garage shop depends to a great extent on the number, type and size of the trucks which are maintained. Comparatively little machinery is necessary in an electric truck garage as compared with one for gasoline commercial vehicles. Each should have a lathe and drill press. The number of these required depends upon the number of trucks maintained. Other small pieces such as emery wheels, band saws, vises, etc., etc., are also requisites of any shop. Besides these there are many other machines used for special purposes.

### How Batteries Are Removed from Trucks

The rapid growth of electric commercial vehicles has made it imperative that special devices for the efficient maintenance of this type of vehicle be provided in the electric garages. One point which has received a great deal of attention is the method of removing the batteries from the trucks and transferring them to the battery room.

For use with trucks which are fitted with the bottom-removal type of battery, many of the garages use some form of hydraulic or compressed-air lifting platforms which are raised to receive the battery while the truck is standing over the platform. One of these platforms of the hydraulic type is shown in the center of the floor in the upper illustration on page 30.

### Batteries Transferred on Hand Trucks

From the platform, the battery is carried to the battery room on small three-wheeled hand trucks, some of which have platforms which can be raised and lowered. When the latter type of hand truck is used the batteries are deposited upon special stands placed on the hydraulic or compressed-air platforms. The hand trucks are then run under the special stands and their platforms raised until the battery is raised from the lift, after which the battery can be easily drawn to any desired location.

### Portable Cranes Save Time

Small crane hoists mounted on wheels and which can be moved over the shop at will are very useful for lifting small parts too heavy for one or two men to carry or lift. The general type of these devices used in truck garages is shown in the lower illustration on page 30 and the upper one on page 33.

For parts which are heavier than the capacity lift of these portable cranes, small or large telphers are used. The illustration at the top of page 31 shows the type of telpher and the type of trav-

Portion of the shop of the Postal Transfer Co.'s garage, showing whitewashed walls and ceiling, proper location of bench but insufficient lighting facilities at the rear of the room

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eling crane used respectively in the machine shop and the chassis-erecting shop of the Fifth Avenue Coach Co.'s garage. The traveling crane shown in the foreground of this view is electrically operated. It runs along the flanges of I-beams attached to the underside of the girders of the floor above. This crane is used to transfer heavy material from one portion of the room to another and has a carrying capacity of 6,000 pounds.

The overhead telpher which extends from the erecting shop into the machine shop is shown at the left in the same view. It is used to transfer engine parts from one room to the other and eliminates the tedious work of pulling material of this character around on small wagons.

### Chain-falls Used on Telpher

The material carried by this telpher is lifted clear of the floor by means of differential block-and-falls attached to carriages rolling on the lower flanges of the telpher I-beam. After the material has been lifted clear of the floor, one man is sufficient to roll the carriage along the telpher to the desired location.

### Telphers Reduce Labor

In this manner material which, if handled by lifting it upon some type of wagon and then rolling it over the floor would have required the services of from two to three men, is done more cheaply by one man and in considerably less time.

Another machine-shop device which is very convenient for overhauling gasoline engines is a metal stand which is equipped with a special carriage mounted on trunnions on two sides of the frame.

Truck repair shop of the Dochtermann Van & Storage Co., showing low ceiling, poor natural lighting and inadequate artificial lighting system with unprotected electric light bulbs. Note that the bulbs are not provided with reflectors and that the light therefrom is diffused over the room instead of being localized upon the work being done. Note the absence of the body on the truck being repaired

One of these devices is shown in the illustration of the garage of the American and Westcott Express companies given on page 30. The engine to be overhauled is securely bolted to the carriage. After this has been done it may be turned in any desired position so that the part to be inspected or repaired is most accessible to the workman.

### Example of Poorly Positioned Shop

A very poorly located garage shop is shown in the lower illustration on page 31. The shop consists of a drill press and workbench positioned on a balcony close to the roof of the garage where it is undoubtedly very warm and where the ventilation is very poor. The skylight is not placed over the balcony, but several feet in front of it so that the light which it affords is not available for work being done on the bench. A shop arranged in a somewhat better manner is shown in the illustration at the bottom of page 32. The workbench is laid out along the street side of the building, directly under the windows. The interior of this garage is whitewashed, which aids to make it lighter than it would otherwise be.

The main portion of the garage of which the view shown at the top of this page is the shop. Before any of the trucks owned by the Dochtermann company can be taken into the shop, their bodies must be removed, due to the small head room. This is done by means of a differential chain-fall. This operation represents a great waste of time which could be eliminated were the shop removed to some part of the garage shown above

### Proper Ventilation Necessary

Ventilation in many of the modern garages has been entirely or partially neglected, while in the older structures previously used for some other purpose than garaging trucks, there is no such thing as ventilation. Many of the latter were horse stables with several small square windows and especially low ceilings. When these structures were changed over to house motor trucks, the ceilings were not raised. As a result, the headroom was reduced to a few feet and the space necessary for proper ventilation made a minimum.

The windows formerly at each stall were boarded up in many cases, leaving only the entrance and exit doors as means for admission of pure air and discharge of the foul. Under these conditions, the foul air would remain at the top of the room and as the ceiling was especially low, the men cleaning and repairing the vehicles stored therein would have to breathe the foul air.

Ventilation and light are two important requisites of any garage shop.

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# Accessories for the Truck

## WESTINGHOUSE STARTING, LIGHTING AND IGNITION EQUIPMENT

Applicable alike to motor trucks or passenger cars, Westinghouse starting, lighting and ignition equipment for 1916 is offered with a new round-case type of starting motor and lighting generator which has reduced the weight of the unit and increased its compactness.

The new starter designs are made for either inboard or outboard mounting to suit the space requirements of the vehicle and are supplied with either one of two forms of pinion shaft, one an automatic screw shift and the other a magnetic shift. The round-type generators are furnished either with or without an ignition unit and can be operated by chain or gear drive from the engine.

For ignition, a vertical Westinghouse ignition unit can be mounted directly on the generator as shown in Fig. 1, or attached separately at some other point more convenient for making electrical connections with the plugs.

Fig. 1—Westinghouse lighting generator with ignition timer, assembled in one unit

When the automatic screw shift is used, the full battery voltage is impressed on the starting motor when the starting switch is closed and it begins to revolve immediately. The motor pinion which meshes with the flywheel gear is mounted loosely on a hollow threaded shaft slipped over the extended motor armature shaft. The end of the threaded shaft farthest from the motor is connected with the end of the motor armature shaft through a spring which thus forms a flexible coupling.

As the load is not large enough to compress the spring when the motor starts, the threaded shaft is revolved by means of the spring in released position. As the motor speed increases, the pinion moves out on its shaft by virtue of the revolving threads, until it reaches the flywheel. If the teeth of the pinion and the flywheel meet instead of meshing the spring allows the pinion to revolve until it does mesh. When this is done, the spring compresses, and the pinion is then revolved by the starting motor as though on a continuous shaft, turning the flywheel.

As the engine fires and the peripheral speed of the flywheel increases and exceeds that of the driving pinion, the latter is forced out of mesh and returns to its original position on the threaded shaft, where it is held stationary by means of a weighted collar on the end of the pinion farthest from the flywheel gear.

During the periods immediately after the engine has passed over any of the points of maximum compression, the spring offers an elastic cushion between the flywheel and the pinion so that the latter will not be thrown out of mesh.

In the magnetic type of pinion shift, the motor armature shaft is hollow and has inserted in it the shaft which carries the starting pinion. One end of this shaft is placed within the lines of force of a special shifting magnet mounted on one end of the starting motor case. The other end of the starting-pinion shaft is connected with the armature shaft by a spring as in the former type.

In operation, when the starting switch is closed, the circuit is completed through the shifting magnet and the motor. The current flowing through the magnet circuit causes the armature and the pinion shaft to rotate. As the motor takes a relatively higher current at starting, the shifting magnet is energized sufficiently to overcome the force of the return spring and draws the pinion shaft through the armature shaft, thus sliding the pinion into mesh with the gears on the flywheel.

When the pinion meshes with the flywheel gear, the current required to turn the engine over is enough to hold the pinion in mesh until the engine fires. As soon as the engine picks up and tends to drive the motor, the current falls off immediately and the return spring throws the pinion out of mesh to its original position. In this type of shift, diagonal teeth are used on the flywheel and the pinion so that they mesh easily.

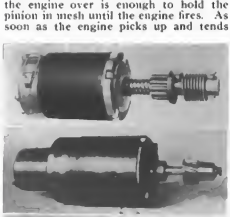

Fig. 3—Three forms of Westinghouse starting motors. Top, inboard Bendix; middle, magnetic; bottom, outboard Bendix

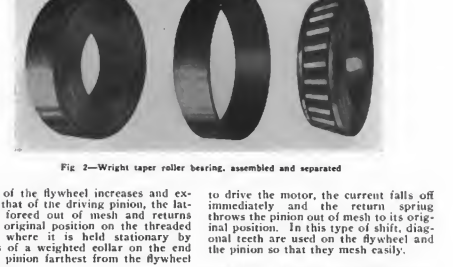

Fig. 2—Wright taper roller bearing, assembled and separated

## B. & B. PORTABLE GRINDER FOR MOTOR CYLINDERS

Portable, and designed to obviate the necessity of sending motor cylinders to the factory of the maker for regrinding, thus laying up the vehicle for undue periods, the B. & B. grinder, made by Boxill & Bruel, Cincinnati, O., consists of a hollow vertical cylindrical stand with a grinding spindle and cutting wheel. The former is fed down into the cylinder by a small horizontal electric motor integral with the device and the latter revolved by a small vertical motor, also integral.

The stand has a flange at its lower end by which the unit is bolted to the bottom flange of the cylinder casting. The stand is also threaded on the inside to take a hollow sleeve which carries the grinding spindle that is fed down and around by the horizontal motor through a train of worms. The sleeve is eccentric to the stand, which thus permits of boring cylinders of different size.

The vertical motor which turns the cutting wheel is flexibly coupled to the grinding spindle and supported on an arm of a vertical bar on top of the stand. The horizontal motor has 1/10 horsepower and the vertical one 1/6. Due to the small combined horsepower of both motors, the current for operating the device may be obtained from a socket in a conventional electric lighting circuit.

The apparatus is shown in operation on a pair of cylinders in Fig. 7, with one-half of the cylinder which is being ground cut away to show the method of grinding in detail.

## STROMBERG MODEL K CARBURETER

Of the concentric type and designed for small motors, the Stromberg model K carbureter, made by the Stromberg Motor Devices Co., Chicago, Ill., differs from previous Stromberg construction in the use of a metal float chamber instead of glass and a single air intake for both main and auxiliary air, arranged for hot-air connection.

The nozzle is fixed in this model and the air valve is of the balanced type. This form of air valve acts in the reverse direction from the usual type, in that it moves against the suction of the engine when opening. This movement is effected by a large disk carried in a

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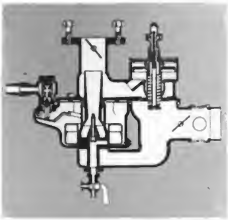

Fig. 4—Cross-section of Stromberg model K carbureter

dash-pot above the valve. The area of this disk is greater than the area of the valve and so tends to counteract the action of the engine suction to keep the valve closed.

In operation, to start the motor the butterfly valve in the air intake is gradually opened until the motor becomes thoroughly heated, the auxiliary air valve being on its seat. Then the adjusting nut on the air valve stem is turned back and forth until the motor idles properly. This is the only adjustment and controls the mixture on low and through intermediate speeds. Due to the fixed nozzle, the correct high-speed mixture is furnished automatically. If the mixture at high speed is too lean, a larger nozzle should be used, and if too rich, a smaller one.

## EISEMANN IMPULSE STARTER

For the production of a hot spark at slow speeds, as required for the starting of large and heavy motors by hand, a coupling has been developed for Eisemann magnetos by the Eisemann Magneto Co., Brooklyn, N. Y. This coupling may be attached to any model of Eisemann magneto and has no effect upon its regular operation except at slow speeds, when it causes the armature to rotate in a series of jumps instead of at a uniform speed. These jumps cause the armature to cut the lines of force of the magnets quickly, or at the same speed that it does when the motor is revolving swiftly, so that a hot spark is generated.

This removes any necessity for battery auxiliary ignition for starting on heavy-duty motors, for a hot, fat spark is generated at any speed, regardless of how slowly the crank is turned.

The coupling consists of a driving tube in the center and a driven cup, inclosing the device, the two being connected by a spring. Within the driven cup is a loose ring, known as the trigger, this ring having a lip which extends through a slot on the periphery of the cup. At the bottom of the coupling is a notched bar, so positioned that as the cup revolves the notch registers with the slot in the cup, so that the trigger lip drops down by gravity and thus locks the cup against rotation.

This is the position shown in the upper view of Fig. 8. On the inside of the trigger ring is a cam which engages a corresponding cam cut in the driving tube. When the lip has engaged the notched bar and the cup ceases to rotate, the driving tube continues to turn. This turning compresses the spring, which is seated against a driving pin on the tube and a block fixed to the cup. At a predetermined point the cam on the trigger ring engages that on the tube and lifts the trigger far enough so that the lip disengages the notched bar, so that the compression of the spring spins the cup around in a clockwise direction.

Fig. 6—External view of Stromberg Type K carbureter

The magneto armature is connected with the cup, and so, as the cup spins around the armature is given a quick twist, producing a hot spark. At slow speed, as the cup revolves, it is caught again and again by the trigger, but when the motor fires, the speed is so increased that the trigger ring, by its own weight becomes a ring governor, and centrifugal force keeps it from dropping down into the slot. In this state, the coupling acts as a dead connection between the drive and the armature ,a small lug on the inside of the trigger ring, at the point where the lip juts out, engaging a notch in the driving tube and thus providing a positive drive as long as the speed is maintained. The coupling includes the standard Oldham coupling for connection with the shaft.

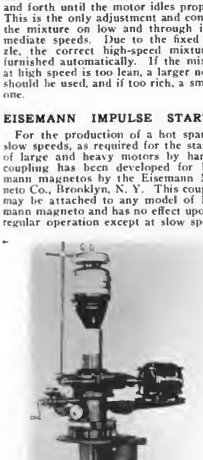

Fig. 7—B. & B. portable cylinder grinder in use. Cylinder is cut away to show grinding wheel in action

## WRIGHT TAPER ROLLER BEARINGS

Claimed to be the original taper roller bearing, the Wright type is now being manufactured by the Pennsylvania Shafting Co., Spring City, Pa., in standard lengths and sizes. The Wright bearing is of the cup-and-cone type and differs from other bearings of this class in that no cage is used to retain the rollers in their proper relative position, this being secured by a certain proper angle of repose between the rollers and the races determined by experiment. Each roller is in a continuous line of contact with both inner and outer races and therefore has a free rolling tread over its entire length. The rollers are in full series, that is, the races are filled with rollers, except that sufficient space is left between them to prevent their binding or engaging in frictional contact with each other when under load.

Fig. 5—Eisemann magneto equipped with impulse starter coupling

One end of each roller is provided with a ripple and the other with a spherical surface which engage freely with two retaining rings, one at each end. These rings are for the purpose of facilitating the setting up and adjustment of the rollers, but play no part whatever in keeping the rollers in place when they carry the weight or pressure exerted upon the bearing.

The Wright bearings are interchangeable with other types of roller bearings or with single-row ball bearings.

Fig. 8—Two views of Eisemann impulse starter: above, just before release; below, when locked at speed

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# Men and Makers

**GENERAL VEHICLE CO.**, Long Island City, has just applied for permits for the erection of an additional unit 200 by 400 feet, to its plant in that city. The new structure is to be one story high, of brick and concrete, and will be located on Starr avenue, east of Borden avenue.

**Autocar Co.**, Ardmore, Pa., will soon commence the erection of an additional building to its plant in Ardmore. The new structure will be five stories and basement in height and will be completed before winter sets in. It will adjoin the recently-enlarged three-story-and-basement building and will have a frontage of 100 feet with a separate wing, 40 by 30 feet. The lighting specifications require the use of steel window sash. The windows will take up 79 per cent of the total exterior wall area with the remaining 21 per cent of brick. The first floor will be used for general offices of the production departments and the top floor for carrying on experiments and other engineering work.

**Packard Motor Car Co.**, Detroit, has just purchased more than 10 acres of land valued at about $75,000 and located between Strong avenue and the belt line railroad in the outskirts of Detroit. While the use to which the new holdings will be put has not been announced, it is believed that large additions to the forge shops and foundry are being contemplated. With its latest purchase the Packard company now has more than 100 acres of factory site, equivalent to a strip about 1,000 feet wide and 1 mile long.

**Velie Motor Vehicle Co.**, Moline, Ill., is making changes at its plant to increase its production. The six-story building heretofore used for storage purposes will hereafter be used by the final-assembly departments and shipping room. With this new arrangement rough material is received at the west end of the main plant and finds its way to the machine shop, first-assembly room and test department and thence to the final-assembly room where the bodies are mounted.

**United Motor Truck Co.**, Grand Rapids, Mich., is building several large additions to its plant in that city.

**Kelly-Springfield Motor Truck Co.**, Springfield, O., held its annual convention of sales representatives at the factory in Springfield on August 26, 27 and 28. The first day was given over to a trip through the factory in the morning with a general discussion and round table in the afternoon together with several short talks by the officers of the Kelly company. Meetings were held both morning and afternoon at the factory on the second day, with a dinner at the Hotel Arcade in the evening. The third day of the gathering was spent in an outing and picnic at Tecumseh park. Three special editions of the Kelly house organ, "Like Kelly Does," were published during the convention. An illustration showing some of the officers and the sales representatives in attendance is given on page 37.

**Studebaker Corp.'s Boston, Mass., Branch** has recently opened a new service station and parts department at Worcester, Mass., to take care of the rapid development of business in that territory. Charles B. Eastman, formerly associated with G. N. Jordan, manager of the Boston branch, has been placed in charge of the new Worcester quarters, which are located at 162-164 Main street.

**Denby-Missouri Truck Co.**, 405 north Twenty-second street, St. Louis, Mo., has been made distributer of the Denby truck in the St. Louis district. G. Y. Parrish will be sales manager of the new concern.

**Loring Motor Car Co.**, Brockton, Mass., has just signed a contract to handle the Flint truck in southeastern Massachusetts.

**Chas. H. Kaar Co.**, Stockton, Cal., distributer of Studebaker vehicles in that territory, has just prepared plans for one of the largest garages in the west. The shops, showrooms and sales quarters will occupy both floors of the two-story building already under construction at Sutter and Miner streets. The new building is to be 100 by 100 feet with 200 lineal feet of plate glass front. An inclined runway will be used to reach the second story in place of an elevator.

**Commercial Auto Body Co.**, St. Louis, Mo., has just closed a lease for the building at the southeast corner of Sixteenth and Pine streets, that city, which will be used as a plant for building motor truck bodies. The offices and showroom now at 3003 Locust street will be retained for the present. The new factory has four floors and a basement with a total floor area of approximately 30,000 square feet. The basement will be used for a mill room, the second floor for assembling, the third floor for trimming and the fourth for painting and finishing. Heretofore the company has made bodies for Ford chassis only, but in the new plant bodies for all makes of chassis will be built.

**Detroit Steel Products Co.**, Detroit, is planning to erect an additional building to its plant in that city to handle an increase in production in its motor vehicle spring department. The new structure will add approximately 15,000 square feet to the company's present floor space. Work on the new building will begin as soon as all the details of the plans are completed. This will be the third addition made to this department of the factory within the past year. The structure will conform in style to the type of the present building and will have steel construction with steel sash windows and concrete floors.

**Sewell Cushion Wheel Co.**, Detroit, has just opened another branch office in Buffalo, N. Y., making eight in all now located in various parts of the country. The others are located in New York City, Chicago, Philadelphia, Pa., Boston, Mass., Cleveland, O., Seattle, Wash., and Los Angeles, Cal. A St. Louis, Mo., branch will be opened in the near future. The new branch at Buffalo will be under the management of A. W. Sewell, who formerly had charge of the fire-apparatus department of the company. George C. Seymour will be assistant manager.

**Sheldon Axle Co.**, Wilkes-Barre, Pa., is increasing its output of worm-driven truck axles by the installation of new machinery and special equipment. The company expects to treble its output after the new installations are completed.

**Detroit Trailer Co., Inc.**, Detroit, maker of the Detroit two- and four-wheeled motor vehicle trailers, has just moved into its new factory located at 671-675 Atwater street, east, in the same city. The former quarters at 90 Woodbridge street were too small to enable the company to keep apace with increasing trailer orders. The capacity of the new plant will be thirty trailers per day.

**Michigan Crown Fender Co.**, Ypsilanti, Mich., manufacturer of motor vehicle fenders, will have a building erected for it in that city by the common council of the town. This was agreed upon at a meeting of the council held last week. The building will be given over to the concern and will be paid for in installments. The new structure will be erected on the M. Gaudy property and will be 400 by 800 feet. It is expected that not less than 500 men and probably as many as 2,500 will be employed, as the company is said to have closed a contract for a large number of fenders for the coming year.

**Fuller & Sons Mfg. Co.**, Kalamazoo, Mich., closed its plant in that city during the week of September 6 for the annual vacation of its employes.

**Turner-Ring Co.**, comprising Gordown B. Turner, of Boston, and Charles B. Ring, of Springfield, has been formed to specialize in building commercial bodies for Ford cars in eastern Massachusetts, with headquarters in Boston at 1118 Boylston street. The company has been appointed retail agent for the Ford to enable it to carry out its plans.

**Gibney Tire & Rubber Co.**, Conshohocken, Pa., held its annual stockholders meeting in Philadelphia, Pa., recently. From reports read at that meeting it was brought out that the monthly business of the company is showing an increase of several hundred per cent over the corresponding months of 1914. A large increase in production facilities has been completed and the factory is turning out five times the quantity of tires it was producing 4 months ago.

**Tire Service Co.**, Kansas City, Mo., Henry Winter, manager, is moving from 1621 Grand avenue to 1606 McGee street, into a one-story building now being completed, leased for 5 years; after 2 years a second story is to be added.

**Kelly-Springfield Tire Co.**, Philadelphia, Pa., has moved its quarters from

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208 north Broad street to its larger new building at 257-259 north Broad street. The new structure is three stories and basement in height with 18,000 square feet of floor space with every facility for conducting a tire business, including a complete service department.

**S. K. F. Ball Bearing Co.,** Hartford, Conn., is the name of a concern incorporated in Hartford, Conn., on September 4 for the purpose of manufacturing and selling S. K. F. ball bearings in the United States. This type of bearing was introduced into this country in 1910 and has since been imported from the main plant of the S. K. F. company in Gottenburg, Sweden. The new plant for the manufacture of S. K. F. bearings in this country will be erected on a site of about 8 acres along the New York, New Haven & Hartford railroad in Hartford. The first building of the ultimate group has already been completed.

**Van Briggle Motor Device Co.,** Indianapolis, Ind., has recently been formed in that city to manufacture a new carbureter invented by L. H. Van Briggle. Those forming the company are: L. H. Van Briggle, H. S. Rominger, Z. F. Harshbarger, U. Z. Wiley, Frank Sivens, R. E. Hosea and E. O. Null.

**G-A Ball Bearing Mfg. Co.,** Chicago, manufacturer of heavy-duty radial and thrust bearings, has just moved into its new quarters at 123-141 Albany avenue, corner of Lake street, Chicago.

**Remy Electric Co.,** Anderson, Ind., has recently established a direct factory branch at 14 west Harris street, Atlanta, Ga. The Remy company was formerly represented there by Alexander Seewald.

**Hartford Automobile Parts Co.,** Hartford, Conn., will move its plant to New Britain, Conn. A building company has been formed to erect a factory on east Ellis street, New Britain. The new structure will be 60 by 200 feet, two stories in height and so constructed that two additional stories may be added if desired.

**A. R. Gruendelle,** formerly identified with the Commerce Motor Car Co., Detroit, is now connected with the Wichita Falls Motor Co., Wichita Falls, Tex., manufacturer of Wichita motor trucks. Mr. Gruendelle has been with the Wichita Falls company for about 2 months. Before joining the organization of the Commerce company he was formerly secretary and sales manager of the old Morgan Truck Co., Worcester, Mass. Later he sold Speedwell trucks at Boston, Mass., and after that handled the Alco from Hartford, Conn.

**L. J. Ollier,** sales manager of the Studebaker Corp., Detroit, for several years past, was recently elected a vice president and director of the corporation. He will also assume the duties of director of sales. Mr. Ollier has had a long experience in the sales end of the motor vehicle industry. Before going to the Detroit plant he was manager of the Studebaker branch in Los Angeles.

**E. R. Benson** has resigned as vice president of the Studebaker Corp., Detroit, to become distributor of Studebaker passenger cars and delivery vehicles in the state of Maine and a portion of New Hampshire. Mr. Benson formerly resided in the New England states. He will make his headquarters in Portland, Me.

**R. T. Hodgkins** has succeeded L. J. Ollier as sales manager of the Studebaker Corp., Detroit. Mr. Hodgkins will be aided by two assistant sales managers, George L. Willman and William T. Bush. All three appointments have meant promotion of men already in the Studebaker organization to positions of greater responsibility. Mr. Ollier is now vice president and director of the corporation.

**M. F. Wollering,** production manager of the Studebaker Corp., Detroit, has just been elected to the board of directors of that concern.

**W. S. Hughes,** formerly identified with the Findeisen & Kropf Mfg. Co., maker of the Rayfield carbureter, Chicago, has recently been made chief engineer of the Falcon Motor Truck Co., Detroit.

**John I. Martin,** formerly connected with the sales department of the Federal Motor Truck Co., Detroit, for the past 3½ years, has recently resigned and become a special sales representative of the Atterbury Motor Car Co., Buffalo, N. Y.

**D. G. Wilcox, Jr.,** has recently been made advertising manager of the Republic Motor Truck Co., Alma, Mich., and will make his headquarters in Detroit. He was formerly advertising manager of the Regal Motor Car Co.

**H. L. Wittstein,** efficiency engineer of the Knox Motors Co., Springfield, Mass., has resigned to accept the position of assistant to the management of the Standard Fuse Corp, Paulsboro, N. J.

**Clarence A. Earl,** formerly general manager of the Hendee Mfg. Co., Springfield, Mass., has recently been made a vice president and director of the Willys-Overland Co., Toledo, O.

**Reide Romig** has recently been made general sales manager of the Kearns Motor Truck Co., Beavertown, Pa.

**Henry Neubauer,** sales manager of the New York City branch of the Studebaker Corp., Detroit, for the past 7 years, has recently been appointed manager of the Studebaker branch in Philadelphia, Pa.

**E. R. Nachtrid,** formerly factory representative of the Willys-Overland Co., Toledo, O., has been appointed assistant to Manager Taxis of the Dallas, Tex., branch of the same concern.

**A. S. Hitchcock** has recently been appointed manager of the truck department of the Cadillac Auto Co. of Rhode Island, Providence, R. I. That company handles the G. M. C. line of trucks in Rhode Island.

**H. M. Roberts,** until recently railroad representative of the General Lead Battery Co., has just been appointed sales manager of the railroad department of the Edison Storage Battery Co., Orange, N. J. He will make his headquarters at the factory of the Edison company in Orange. Mr. Roberts is a graduate of the Sheffield Scientific School of Yale University, class of 1905, and for 6 years thereafter was connected with the engineering department of the New York Telephone Co. Later he spent several years in general contracting work with James Stewart & Co. Inc., New York City.

**J. G. Rumney,** general manager of the Detroit Steel Products Co., Detroit, left that city August 23 for an extended business trip throughout the western territory. He will visit the representatives of his company in all of the large cities in the west with a view to getting first-hand information relative to general business conditions in the west.

**Charles S. Whitney** has recently joined the staff of the Willard Storage Battery Co., Cleveland, O., and will become sales manager and assistant to the manager of the Chicago branch of that company. He was formerly manager of the motor vehicle department of the Westinghouse Electric Co., Pittsburgh, Pa., at the Chicago branch of that concern.

**H. J. Hines** has recently been elected president of the Toledo Machine & Tool Co., Toledo, O. He has been general manager for several years past.

**D. H. Wetzel,** associated for some time with the Mott Wheel Wks., Utica, N. Y., in an advertising and sales way, has been appointed assistant manager of the works.

**R. S. Bryant,** for many years identified with the organization of the Standard Welding Co., Cleveland, O., has recently been appointed factory manager in charge of all manufacturing for the same concern.

**Charles H. Minto** has been appointed manager of the tire department of the United States Rubber Co. of California, San Francisco, Cal.

**D. L. Thorpe** has just been appointed manager of the truck-tire department of the Hood Tire Co., St. Louis, Mo.

**R. H. Grant** has recently joined the staff of the Dayton Engineering Laboratories Co., Dayton, O., as sales manager. He formerly occupied a position of sim-

Some of the officers and sales representatives of the Kelly-Springfield Motor Truck Co. who attended the annual sales convention held at the Kelly factory in Springfield, O., on August 26, 27 and 28. Meetings at which papers were read were held the first two days of the convention and a picnic on the third day at Tecumseh park

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When the salesman for a Wichita truck tells a customer that the truck will climb steep grades and that the brakes will hold on grades, he speaks from certain knowledge, not from hope and belief. In the above view is shown the testing hill at the Wichita Falls, Tex., plant of the Wichita Motor Truck Co., which is typical of the obstacles used in many truck factories. This testing trestle has been in use 5 years. One of the grades is 27 per cent and the other 18 per cent. The trucks are required to go up the 18-per cent grade and also up the 27-per cent one in low or second, of course. The brakes must be able to hold the vehicle on the steep grade also. This is not the only stunt the vehicles must go through, for they are also given long runs over the plains before they get the tester's o. k.

ilar nature with the National Cash Register Co. in the same city.

**Co-Operative Delivery Service,** Springfield, Mo., is building a two-story brick garage opposite the present quarters of the company, which will be completed by October 1. The upper story will be used for storage. The ground floor will be equipped for repair work. The present quarters will be continued.

**Andrew L. Riker,** the first president of the Society of Automobile Engineers, has been appointed to serve on the recently-formed civilian advisory board of the United States Navy department.

**Earnings of the Texas Co. in 1915** increased $272,234, while the surplus decreased $242,647. These figures are for the fiscal year 1915 ending June 30. The net earnings in 1915 amounted to $8,024,692 and in 1914, $7,752,458. Last year the company paid out $3,000,000 in dividends, as compared with $2,550,000 in 1914.

**Kisselkar Trucks,** made by the Kissel Motor Car Co., Hartford, Wis., are described and pictured in a new forty-page catalog just brought out by the Kissel company. Seven pages are given over to line drawings of the seven different models of Kisselkar trucks now on the market. These range in size from a 1,000-pound delivery vehicle to a 6-ton truck. Complete specifications of each model are given directly below the line cut of that particular model. Twenty-seven pages are given over to illustrations showing Kisselkar trucks in actual service in various kinds of work. Twenty of these illustrations are contained on each page. The inside rear cover of the book gives the names and addresses of Kisselkar dealers throughout the United States. These are alphabetically arranged according to states. The book is 9½ by 16 inches, printed on coated paper with a gray cover.

**B. A. Gramm's Trucks for Contractors** is the title of a two-color folder recently published by the Gramm-Bernstein Co., Lima, O., maker of the B. A. Gramm truck. The folder describes and pictures the various component parts of B. A. Gramm trucks and points out how their design is particularly adapted for contractors' work. Specifications of the entire B. A. Gramm line are given, together with eight illustrations of trucks in actual service.

**A Wilson Truck Climbed Pikes Peak** on August 26, the date of the formal opening of the world's highest highway. The route is a masterpiece of mountain engineering and is open only to self-propelled vehicles. The Wilson truck, a 2-tonner, began the ascent from Glen Cove, which is 12,000 feet above sea level, and continued to the highest point possible to reach at the present time owing to road building work that will ultimately permit vehicles to reach the very summit. This portion of the route is 11 miles long and contains grades from 10 to 30 per cent with many sharp hairpin turns and much soft going. The Wilson truck made the up trip in 1 hour 50 minutes, and the descent in 55 minutes. It has since made several other ascents over the same road carrying a full load on each trip.

## Commercial Motor Vehicle Agencies Recently Established Throughout the Country

| | | |
|---|---|---|
| Baltimore, Md. | Dendy | Auto Truck & Service Co. |
| Louisville, Ky. | Denby | Strater Garage |
| St. Louis, Mo. | Denby | Denby Missouri Co. |
| Brockton, Mass. | Flint | Loring Motor Car Co. |
| Athens, Greece | Kisselkar | S. Vichos |
| Davenport, Iowa | Kisselkar | A. W. Van Houton |
| Kansas City, Mo. | Kisselkar | Bruening Auto. Co. |
| Middlesboro, Ky. | Kisselkar | Wallbrecht & Fink |
| Port Deposit, Md. | Kisselkar | Hagerty, Sr., & Son |
| Portland, Ore. | Kisselkar | Pacific Kisselkar Branch |
| Richfield, Wis. | Kisselkar | Richfield Motor Co. |
| Salt Lake City, Utah | Kisselkar | Utah Motor Car Co. |
| Turin, Italy | Kisselkar | G. Picetta |
| Allentown, Pa. | Vim | Krause Auto Co. |
| Ardmore, Pa. | Vim | Keystone Garage |
| Atlantic City, N. J. | Vim | Eastern Motor Co. |
| Baltimore, Md. | Vim | Larrash & Scullett |
| Camden, N. J. | Vim | Oscar A. Eastlack |
| Chambersburg, Pa. | Vim | W. L. Forney |
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| Fall River, Mass. | Vim | David M. Connell Co. |
| Hartford, Conn. | Vim | Keeney Garage |
| Hazeltown, Pa. | Vim | John Deach |
| Indianapolis, Ind. | Vim | Indianapolis Auto Sales Co. |
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| Portland, Ore. | Vim | Gerlinger Motor Car Co. |
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| Pottsville, Pa. | Vim | Joseph Davenport |
| Rockford, Ill. | Vim | H. A. Gabe |
| San Francisco, Cal. | Vim | A. B. Costigan |
| Shamokin, Pa. | Vim | Erb & Zeisse |
| South Bend, Ind. | Vim | William Devall |
| St. Joseph, Mo. | Vim | Howard Auto Co. |
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| Memphis, Tenn. | Wichita | John C. Dix & Co. |
| Portland, Ore. | Wichita | Pacific Coast Wichita Truck Co. |
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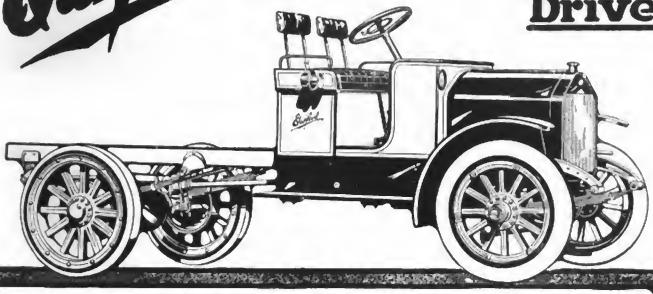
# Garford

## 1 Ton Worm Drive



*Announcing*

## The Maximum Utility Truck

# $1450

*f. o. b. Lima*

THIS one-ton Garford fills the only gap that remained in our unusually complete line of motor trucks.

Garford distributors are now in a position to offer without qualification, a motor truck to fit *perfectly* any business—large or small. They can offer selection of vehicles of ¾, 1, 1½, 2, 3, 5 and 6 ton capacity.

This newest Garford has that *smooth-running worm-driven rear axle* which has proved so effective in the Garford 1½ ton truck.

It has a powerful motor—4 cylinders 3½" by 5⅛" en bloc. It has high tension magneto ignition—combined splash and force feed lubrication—thermo-syphon cooling and many other advantages tending to produce absolute efficiency.

And best of all—from the dealer's standpoint—the Garford one-ton truck appeals directly to the substantial business man looking for high-grade construction at a reasonable price.

The unusual combination of utility, efficiency and price opens a vast market for this truck. Linked with the other trucks of the Garford line, it gives our distributors unequalled opportunity for extensive sales.

There is some territory open. It will pay you to investigate.

Wire or write today. Please address Dept. 103

## The Garford Motor Truck Company, Lima, O.

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**The use of Sheldon products by any manufacturer is a certain indication of a desire to give greatest efficiency to the ultimate consumer. For upon that basis only are Sheldon products manufactured.**

# SHELDON

## The Sheldon Axle and Spring Co.

**Makers of Springs and Axles for More than 50 years**

**Wilkes-Barre, Pennsylvania**

| Chicago: | Detroit: | San Francisco: |
|---|---|---|
| 122 S. Michigan Blvd. | 1215 Woodward Ave. | 444 Market St. |

"Exhibiting Section 16, Transportation Bldg., Panama-Pacific Exposition, San Francisco"

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# A Ten Minute Job

Ten Minutes in McGraw's free Service Stations will equip each of your wheels with

## McGraw Truck Tires

***Types—*** Demountable. Pressed-On.

***Styles—*** Channel Base. Regular Straight Steel Base.

***Profile—*** European—Contains 15% to 20% more usable rubber than others.

***Price—*** Write for Special discounts.

## Guaranteed 8000 Miles

## The McGraw Tire & Rubber Co.

**East Palestine, Ohio**

BRANCHES { New York, Philadelphia — Atlanta, Boston — Chicago, Kansas City — Buffalo, Newark




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that are guaranteed to withstand the normal and abnormal strains imposed on them are the product of our plant.

We test and analyze every piece of steel we use—we check every operation—we guarantee all our product through and through and we require a higher standard in our finished product than the vehicle manufacturer specifies.

Add to the value of your product by using our product.

THE
WYMAN
and
GORDON
COMPANY

Worcester,
Cleveland, Detroit

**Four Minutes to Discharge Load**

One man by hand can elevate and discharge the load of this 5-tonner in four minutes. It is a Peerless truck New Ideal equipped having side delivery.

New Ideal Coal Bodies are made from one to ten tons, hand or power hoist. Power hoist elevates in two minutes. Can be made to your specifications to fit any chassis and can be packed and shipped anywheres.

Photographs and information on request

**New Ideal Wagon Works**

1843-1845-1847 Park Ave., near 126th St., New York

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## An Ohio Road Building Outfit

Here is another case where TROY TRAILERS double the earning power of the Truck. This isn't an unusual case, but simply a common every day occurrence.

Troy Trailers are built in the following sizes, 1½, 2½ and 5 ton capacity. Can be equipped with either Dump or Platform Bodies. Just write for catalog 4CV, and learn more about cutting costs on big jobs.

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New York 50 Church St — Detroit 113 First St. — St. Paul 331 Amer. Nat'l Bank Bldg
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**Troy Trailers**

**WEST'S CAST-STEEL WHEELS for MOTOR TRUCKS**

**Are used by America's leading Truck Builders**

These wheels were designed by, and are built under the supervision of, experienced engineers. They have been thoroughly tested and have proved they will stand hard usage and abuse.

Over 8,000 WEST'S CAST-STEEL WHEELS are now used on trucks and **not one of them** has failed to give satisfaction.

Specify WEST'S CAST-STEEL WHEELS on every heavy truck you buy

**The West Steel Casting Company**
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SPARK PLUGS
ARE THE BEST

BECAUSE—1. They are the strongest made; 2. They are absolutely indestructible; 3. One Comet or Sootless will outlast four of any cheap porcelain or mica washer plug made; 4. They are absolutely compression-tight. *Safe, Sure and Reliable. For sale by all dealers.*

Manufactured by OAKES & DOW CO., 15 Chardon St., BOSTON, MASS.

BOSCH

Magneto included in the specifications is evidence of the superiority and reliability of that motor truck.

Be Satisfied—Specify Bosch

Bosch Magneto Co.
203 W. 46th St., New York

U. S. MOTOR TRUCKS
—have won the confidence of their owners throughout the world by 5 years of matchless performance, service and durability.

RELIABLE DEALERS WANTED

The Agency Is a Valuable Asset

Capacity
2 Ton
2½ Ton
3 Ton
4 Ton

If you are considering taking on an agency, or should be dissatisfied with present arrangements, WRITE US. Our proposition is a money-maker. Address Contract Dept. D.

THE UNITED STATES MOTOR TRUCK CO., Cincinnati, Ohio

PIERCE
PIONEER WORM DRIVE

All Pierce-Arrow Trucks are equipped with the worm-gear drive, which is a positive guarantee of effective service under the most difficult conditions.

PIERCE-ARROW MOTOR CAR CO.
BUFFALO, NEW YORK

Kelly-Springfield
TIRES FOR COMMERCIAL VEHICLES

For maximum mileage at minimum cost, equip your trucks with Kelly-Springfield sectional Block Tires on the rear wheels and Kelly-Springfield Pressed-On or Demountable endless Tires on the front wheels. This is the ideal tire equipment for commercial cars. It will deliver record mileage even under unusually severe service conditions.

Kelly-Springfield Tire Company
Akron, Ohio
BRANCHES IN ALL PRINCIPAL CITIES


SPECIAL ISSUE
OF
THE COMMERCIAL VEHICLE
OCTOBER 1, 1915

SEE ANNOUNCEMENT ON PAGE 3


British Motor Engineer

with show room and connections is open to represent manufacturers of Constructional material for "Trucks," etc.

Box C.R.G. The Commercial Vehicle

FRAMES
THE PARISH & BINGHAM CO
CLEVELAND OHIO

Our entire engineering force is at your disposal.


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# MODERN 1915

## GET IN LINE

With your co-operation, we are able to supply you with just the truck that will give the most satisfactory and profitable results in your business—Chain or Worm drive models.

**Model "H" 1½ Ton Chain Drive. Model "L" 1 Ton Worm Drive**
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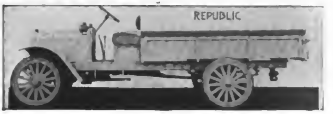
**The Bowling Green Motor Truck Co., Bowling Green, Ohio**

# EQUIP YOUR TRUCKS WITH THE PIERCE GOVERNOR

*Used by fully 70% of all truck manufacturers*

PIERCE SPEED CONTROLLER CO.
Anderson, Indiana




¾-Ton Model

# Republic Motor Trucks

***The Fastest Selling Line of Motor Trucks in America***

| | |
|---|---|
| ¾ Ton with Express Body, Internal Gear Drive | $ 995.00 |
| 1½-2 Ton Chassis, Internal Gear Drive | 1575.00 |
| 1 Ton Chassis, Chain Drive | 1350.00 |
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The Vitals of the Republic
1 and 1½-TON MODELS (CHAIN DRIVE)

| | |
|---|---|
| Continental Motor | Russel Full Floating Jack Shaft |
| Timken Axles | Covert Transmission |
| Bosch Magneto | Standard Cone Clutch |
| Stromberg Carburetor | Firestone Tires |

***No Better Units Built***

We ask the opportunity to prove our statements. Wire or write for catalog and complete information.

**Republic Motor Truck Co., Alma, Mich.**

**Always on the Job** Standard DETROIT USA *CHAIN AND CHAINLESS* *TRUCKS*

**Dealers Receive Real Cooperation**

STANDARD Trucks have been sold in almost every large city of the U. S. A. with practically no advertising, which demonstrates that the remarkable mechanical perfection of STANDARD Trucks have won and held the confidence of the buying public. It will pay "live dealers" to investigate our very liberal agency proposition. Send for Booklet B-26 describing all capacities.

**Standard Motor Truck Co., Detroit, Mich.**




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# The Highest Efficiency

is attained in this worm-drive truck by powerful construction according to a correct four-wheel-drive principle which distributes and equalizes the driving stresses.

**MORTON TRUCKS, 1½ to 6 Tons Capacity**

in both regular type and four-wheel-drive are built to take hard usage and show permanent economy.

This serviceability is due to the thorough design of the vehicle as a whole and the use of the better standard parts. Study the specifications!

Write us for open territory and get into this four-wheel-drive business.

## Morton Truck & Tractor Co.

HARRISBURG, PA.

COVERT COVERT COVERT

# TRANSMISSIONS

## Of the Highest Quality

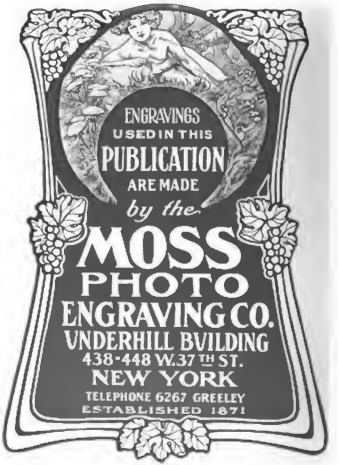
Covert Transmissions are the result of many years' successful transmission building—today they are recognized as the best—not only in point of service and durability but also in regard to quietness and all around efficiency.

Made in various models for different sizes and types of cars—Covert Transmissions will free you from transmission troubles. Let us show you how they fit your construction.

## Covert Motor Vehicle Co.

SALES OFFICE Detroit, Mich. FACTORY Lockport, N. Y.









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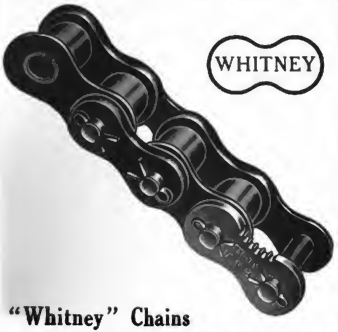



**"Whitney" Chains**

are made by specialists in the foremost organization for chain design and manufacture in America. Our aim is dependability of service under hardest conditions, and our success in this is shown by the standardization of "Whitney" Chains by the leading motor truck makers of the country.

**The Whitney Mfg. Co., Hartford, Conn.**
Chains—Keys—Hand Milling Machines

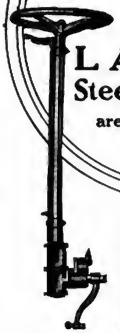
# Eliminate Doubt

**make assurance doubly sure**

There is a real reason why

**LAVINE Steering Gears**

are recognized as America's standard



More than any other part of the truck equipment, the steering gear needs to be reliable. Neglect in this respect may very easily lead to serious trouble. LAVINE Gears will set your mind at rest.

**The answer lies in the fact itself**

Four sizes—½-ton to 5 tons. Send for blue prints.

**LAVINE GEAR COMPANY**
Station A RACINE, WIS.

# The United Line

DEALERS—
[illegible] With
[illegible]

| | |
|---|---|
| 2 ton Worm Drive Truck | $2250 |
| 3½ ton Worm Drive Truck | 2900 |
| 5 ton Worm Drive Truck | 3400 |

Nothing Experimental—
Nothing Obsolete

Continental Motor
Eisemann Magneto
Amplifiers Carburetors
Wave Radiator

Brown-Lipe Transmission
Spicer Drive Shaft
**United Factors**
Structural Steel Frame
Tale Jacked Speed Governor

Perfection Springs
Timken Axles
Timken Bearings
Gemmer Steering Gear

**UNITED MOTOR TRUCK CO.** Grand Rapids Michigan

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OF THE 93 manufacturers who use Eisemann magnetos in this country, 69 are truck makers.

If you are not one of the 69 Eisemann users you are not getting the greatest possible ignition efficiency.

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FEDDERS RADIATORS

# Quality

Many of the foremost manufacturers of pleasure cars and trucks are shrewd enough to discriminate between qualities and attributes.

*Quality is Perceived*
*Attributes are Ascribed*

Quality is that which makes or helps to make a thing what it is.

Fedders quality is what makes or helps to make Fedders Radiators the most efficient—it is a fact—something that is proved; not merely an attribute we have ascribed to them.

Fedders Quality is worthy of your consideration—adoption.

**Fedders Manufacturing Co.**
Incorporated
BUFFALO NEW YORK

# Baker Electric Trucks

**The vitally interesting thing about a Baker Electric truck is its satisfactory service at low upkeep cost.**

**It can do your work better at less cost. Convincing facts are yours for the asking.**

**The Baker, R. & L. Company, Cleveland, O.**
Manufacturers of Baker and Rauch & Lang pleasure cars and Baker trucks.

## When a Man Buys a Truck

the first thing he wants to know is what kind of a motor it's got. He wants to be sure first of all of the power plant. He wants a motor with a record behind it, a motor that other truck owners have tested out for him, that they have found stands up to the grind of hard, gruelling work day in and day out, year in and year out.

*Wisconsin*
EXCELLENT
**Motors**

have won their high standing because of the service they have given. They are durable, economical, dependable.

Wisconsin Motor Mfg. Co.
Station A, Dept. 310
Milwaukee, Wisconsin

*Write now for special catalog*

Type T-U
4 in. bore,
6 in. stroke
Intake View

Type U-U
4¼ in. bore,
6 in. stroke
Exhaust View

# SOUTH BEND

## Double Duty Trucks

—once put in service—always remain in service.

Whatever your business may be there is a SOUTH BEND DOUBLE DUTY TRUCK that will give you the utmost efficiency and satisfaction.

***Wisconsin motors, Warner transmission, Sheldon axles, Ross steering gear, Bosch ignition. Either chain or worm drive.***

SOUTH BEND DOUBLE DUTY FIRE APPARATUS in all cases more than performs its duty.

Attractive Dealer Proposition. Write us at once.

**South Bend Motor Car Works**
SOUTH BEND, IND.



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# RADIATOR INSURANCE

**The cooling section of this Rome Helical Tube Truck Radiator is guaranteed for the life of the truck.**

**Highest in Quality and Efficiency** **Highest in Price**

*Write us for details*

**ROME-TURNEY RADIATOR COMPANY**
**ROME, NEW YORK**

One of six Jeffery Quads in the service of the United States Army Signal Corps. This is the most powerful portable wireless station in the world. The Jeffery Quad drives, brakes and steers on all four wheels.

**The Thomas B. Jeffery Company**
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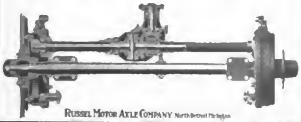
## Internal Gear Drive Axles

## Proof of Serviceability

Every one of the Internal Gear Rear Drive Axles which we have sold has been and is now giving satisfactory uniform service under trucks.

The most exacting experience with trucks using the RUSSEL Internal Gear Axle has proven beyond question the correctness of this principle and of RUSSEL design, and has demonstrated the dependableness of RUSSEL reputation for high quality of workmanship and materials.

**RUSSEL MOTOR AXLE COMPANY**
**NORTH DETROIT, MICHIGAN**




# FAFNIR

SEND FOR CATALOG
FAFNIR BEARING COMPANY
NEW BRITAIN, CONN.

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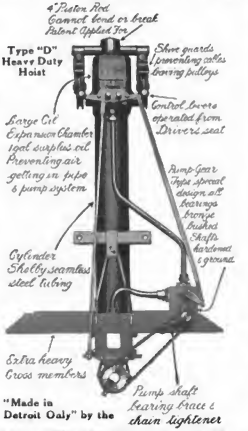
## The Wood Hydraulic Hoist

SOLVES THE DUMPING PROBLEM FOR MOTOR DUMP TRUCKS




"Made in Detroit Only" by the

**WOOD HYDRAULIC HOIST & BODY CO., Detroit, Mich.**

Successors to WOOD HYDRAULIC HOIST CO., St. Paul, Minn.



# FULLER
## Unit TRANSMISSIONS

Model "T U" ¾-1 Ton

Model "T U 2" 1½-2 Ton

*Particulars sent on request*

**FULLER & SONS MFG. CO.**
Kalamazoo, Mich.

# Annular Ball Bearings Reground

ONE FIRM ONE SERVICE

ONE GUARANTEE

BACK OF

EVERY BEARING REGROUND

BY

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# Ross Steering and Differential Gears

**Will Help Sell Your Trucks**

They are
**STANDARD**
on good motor truck construction

**Investigate**

our new complete line of fore and aft steering gears.

Enormous bearing surfaces
Perfect lubrication
Best material throughout
Finest workmanship

Built in the largest and newest steering gear factory in the United States.

*Write for catalog*

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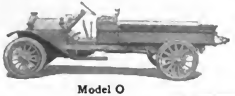
CONSTANT-DEPENDABLE-SERVICE
PITTSBURGH MODEL ENGINE COMPANY
MODEL MOTORS
PITTSBURGH PA.

# Transportation Records

The efficient and practical record of transportation service rendered by SANFORD TRUCKS is the natural result of quality, proper manufacturing and engineering methods.

If you need a Motor Truck, there are many reasons why you need a SANFORD.



Model O

Model O
¾ Ton
$1350
Express

$1290
Chassis

Model M
4000 lbs.
Capacity
$2000
Express

$1910
Chassis

Model M

Dealers are requested to send for Sales Plan and inquire for open territory.

**Sanford Motor Truck Company**
Syracuse, N. Y.

# MACK *and* SAURER TRUCKS

THE proved and tested product of America's premier truck builders who for nineteen years have built trucks and only trucks.

The new models embody many refinements of mechanical detail and chassis equipment. Let Mack and Saurer service records show you what the right truck can do for *you*.

INTERNATIONAL MOTOR COMPANY
64th Street and West End Ave., New York

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# Celfor INTERNAL GEAR DRIVE Axles

**For Motor Trucks—Absolutely Quiet**

If you want a strong efficient unit drive that is specially designed for truck work, from one to three tons capacity, write us for complete information about the

## Celfor
## Internal Gear Drive Rear Axle

It possesses marked constructional advantages which commend it to thoughtful designers, engineers and truck makers. We shall be glad to go into these in detail on request.

**Write today for details, catalog and prices**

**Celfor Tool Company**

**Buchanan Michigan**

# Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor **specialists.** The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

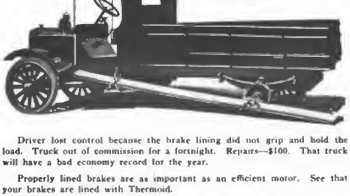
We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

**BEAVER MFG. COMPANY**

**Milwaukee Wisconsin**





**Horses are cheaper than this**

Driver lost control because the brake lining did not grip and hold the load. Truck out of commission for a fortnight. Repairs—$100. That truck will have a bad economy record for the year.

Properly lined brakes are as important as an efficient motor. See that your brakes are lined with Thermoid.

**Watch Your Brake Lining**

Thermoid is brake lining clear through—not merely on the surface. It holds even when worn paper thin. It is cured under hydraulic compression into a solid substance of uniform density and frictional power. Guard your trucks with Thermoid.

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## HYDRAULIC COMPRESSED
## Brake Lining - 100%

***Our Guarantee:*** **Thermoid will make good or we will**



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—the outgrowth of the brains of foremost engineers—establish a new economy and service for users.

**Selective Type**
**Individual Clutch System**
**Exclusive Safety Devices**

In addition to transmissions in standard cases, special units can be furnished for attachment to any well-known make of motor, in Unit Power Plant construction.

**Cotta Transmission Company**

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***"If it's made of felt, ask Booth"***

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BUDA MOTOR
The part to buy the car by

# Performance—Not Price

THE maker who equips his truck with the Buda Motor does not select his motor on price alone. He is jealous of his reputation and his product; he believes that his customers' satisfaction is part of the bargain when they hand him their checks. So, regardless of price, he makes comparisons and careful tests and finishes by selecting the Buda Motor, built by a great organization which *for 35 years* has backed every last screw and bolt of its product with its name and all its vast resources. Every Buda Motor is not only guaranteed—it is *much more than guaranteed* by the fact that a part of its duty is to live up to the name it bears.

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## Reasons Why You Should Buy
# B. A. Gramm Trucks

**BECAUSE:**

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You Don't Have to Shift Them, and
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Don't Take Our Word for It; We Are Here to Prove It.

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Lima, Ohio U. S. A.

# Truck Tires Free

### Unless the Goodyear S-V Outwears Any Other

We now extend this Guarantee to October 1st. Many truck owners were not in shape to accept it during April, May and June. And we want every user to have this chance to prove the S-V best.

**Equip opposite wheels—at the same time—one with a Goodyear S-V, one with any other standard Truck Tire of like rated size, bought in the open market. If the Goodyear S-V fails to cost less per mile than the other, we will return you its full purchase price, making the S-V free.**

Get this guarantee in writing when the tires go on. Equip all the wheels you wish. Compare the Goodyear S-V with every seeming rival in this convincing way. Then you will end all your costly experimenting. Then you will know the truth.

We guarantee the Goodyear S-V, against any tire that's built.

We dare do this because we have already made 5,000 tests and comparisons. Barring accidents, the Goodyear S-V will surely win against any rival Truck Tire. There are reasons for it. One is more available tread rubber. Another is no creeping, no bulging or breaking, no possible separation. The tread, the backing and the rim are one. Our local branch will tell you where to get the S-V tires under this signed warrant.

GOODYEAR
AKRON, OHIO
S-V Truck Tires

**The Goodyear Tire & Rubber Co., Desk 56 Akron, Ohio**
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We make Demountable, Block, Cushion, Pneumatic and Other Types of Truck Tires




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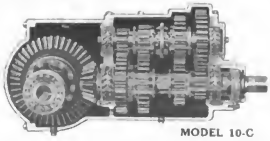
95% of all commercial vehicles are operated by hired drivers. Many are careless in shifting gears—and costly damage often results.



MODEL 10-C

A Cotta "Short Series" Transmission is insurance against the carelessness of hired chauffeurs. Its construction is rugged. Speed changes are accomplished by heavy "dog clutches" that insure easy and safe engagement.

*Make it Standard Equipment on Your Truck*

**COTTA GEAR CO., 720-730 Sixth St., Rockford, Ill.**

**Cotta Short Series Transmission**

## Unbreakable

You are protected. We guarantee that the Transimeter (Hub Odometer) will not break no matter what accident befalls it.

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It is dirt-proof and grease-proof. The figures are always right side up and easy to read.

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The Duplex is the peer of any truck built for strength and general efficiency. Made in two-ton and three-ton capacity. Fully covered by patents.

***We have an attractive dealers proposition. Get in touch with us immediately.***

**THE DUPLEX-POWER CAR COMPANY**
*Manufacturers of* — **Four Wheel Drive Trucks**
**CHARLOTTE, MICH.**

# GOODRICH
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**Cudahy Packing Co., Kansas City,**

is *very well satisfied* with Goodrich Wireless Truck Tires. The illustration shows one of their trucks—a 5-ton Pierce-Arrow.

Goodrich Wireless are replacing other makes of truck tires at the rate of over 1,200 per month!

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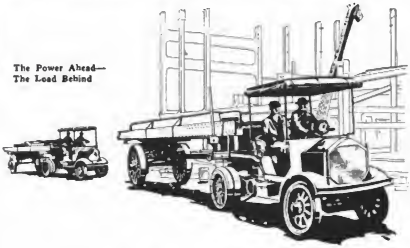
## By Hauling Your Loads With a KNOX Tractor

The Power Ahead—
The Load Behind



THE Knox TRACTOR

The Knox Tractor can be the motive power for three trailers, one loading, one unloading and one moving.

The Knox does not carry and push its load like a truck—it hauls it behind. With a double set of springs, no matter what the load, the tractor mechanism does not have to support an additional pound. Flexible springs for the tractor, stiff springs for the trailer.

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Contractors will find in this 3½-ton Bessemer, equipped with Wood Hydraulic Hoist, the logical truck for their hauling problems.

Only the best obtainable materials and workmanship are employed in the construction of Bessemer trucks.

Let us tell you why the Morgan Johnston Contracting Company of the capital city, who own two Bessemers, made it their choice.

The Bessemer line includes both chain and worm driven models. Send for descriptive literature

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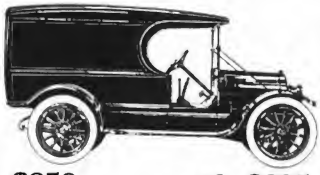

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*With open body*
*Equipped with Electric Starting and Lighting System*

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The Overland Delivery Car adds to your area of operations, increases your trade and multiplies your profits.

And its price is less than $900.

*"Made in U. S. A."*

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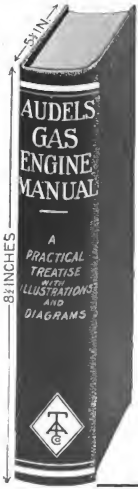
Toledo, Ohio

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## American Made for American Trade

Are made in four types, each in a variety of sizes calculated to meet every motor car requirement, and every New Departure Ball Bearing is *Guaranteed* in respect to material, precision and finish.

The New Departure Single Row is internationally standardized and therefore interchangeable with any foreign or domestic bearing of equal width, diameter and bore.

*For Your Convenience*, New Departures are stocked at our factory, at our Detroit Branch and in 49 trade centers of the United States, Canada and England.

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# Differentials Transmissions

IT is with regret that we are forced to announce at the present time that we are unable to contract for any further business before the first of the coming year.

Much as we desire continually to add new names to our already long list of satisfied customers, we feel that in justice to our present customers we should not consider new business when it is taxing us almost beyond our limits to keep up with their schedules of deliveries.

By the first of the year we hope to be able to take on some new business with definite deliveries possible, but the realization of that hope is predicated entirely upon our being able at that time to take care of those customers we have.

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TRANSMISSIONS
**SYRACUSE, NEW YORK**
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## Worm-Drive Trucks

## For the Manufacturer

There is a type and capacity Signal truck for practically every haulage requirement.

Signal trucks are simple in design and construction and in operation. Silent in use, efficient, and made for long and constant service.

Best of all, Signal Trucks cost less to operate than you are aware and if interested let us refer you to SIGNAL OWNERS in your line of business—they know.

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| 1 Ton Chassis—Worm Drive | $1500 |
| 1½ Ton Chassis—Worm Drive | $1700 |
| 2 Ton Chassis—Worm Drive | $2000 |
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**SIGNAL MOTOR TRUCK COMPANY**
**Detroit, Michigan, U. S. A.**

**Two-ton SIGNAL**
**Used by one of the large can manufacturers**

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# *We wonder how many others can profit—Read:*

Subscription Department,
Commercial Vehicle,
New York City.

Gentlemen:—

Some time ago one of the automobile firms sent me a re-print of some corking good articles which appeared in your magazine. I have tried all over town to find it for sale—but was not able to locate a dealer. Will you please enter my subscription for a year and bill me in the regular way. (Don't know the subscription price.)

Above all though—please mail me the back numbers in which the Model Garage of the Kaufmann & Baer Store in Pittsburgh is described. I think it must be in the 1st of October number of 1914—send all numbers containing part of this article, so that I have the complete write up.—I have the re-print of Aug. 15th-Sept. 1st-Sept. 15th—1914, in which the observations of the Kaufmann Delivery System are described. I would not take ten dollars for the statistics contained therein. I am anxious to read the description of the Garage.

For your information wish to say that I am the Efficiency Engineer for the largest Department Store here in town. Please mail the back numbers and the Magazine subscription to 1321 West 30th St., Los Angeles, Calif. DO NOT DELAY THE back numbers. Check will be mailed promptly.

Very truly yours,

PAUL VON KOENITZ,
With J. W. Robinson Co.

August the 25th, 1915.
Los Angeles, Calif.




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J. M. Wheeler, President,
Northwestern Motor Sales Co.,
Butte, Montana,
Federal Distributors.

# —Another FEDERAL Endorsement

"Federal Trucks win everywhere for us in competition for fuel economy - continued hard service— fewer repairs— dependability and durability. Our work as distributors for Federal units has been most pleasant and profitable— for the truck is all good that can be said of it— then *we know* the Federal Organization behind their product— this also means much to the prospective buyer and contented Federal owner."

What better endorsement of the FEDERAL Proposition could you ask for than this letter from Mr. Wheeler whose phrase "pleasant and profitable" expresses the feeling of Federal Dealers everywhere that FEDERAL TRUCKS and FEDERAL ORGANIZATION will "win everywhere" when put to the test.

The Federal way is the way to success, write today.

**Investigation Leads to Federalization**

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**Northwestern Motor Sales Company**
AUTOMOBILES AND MOTOR TRUCKS
P. O. BOX 897
**Butte, Montana** June 21, 1915.

CHANDLER

MOTOR CARS AND TRUCKS

Federal Motor Truck Co.,
Detroit, Michigan.

Gentlemen:

The writer, having been closely identified with the Motor Truck selling situation in this Northwestern territory for five years, is desirous of advising you of his high regard and of his years of excellent success with Federal units. We have now twenty or more Federals working every day and all day in this community, where we have absolute watch and check on them -- they are all giving the best of service to their owners -- none have been resold as second-hand or used trucks -- nor will they be owing to the performances they show their satisfied owners.

Federal trucks win everywhere for us in competition for fuel economy -- continued hard service -- fewer repairs -- dependability and durability. Our work as distributors for Federal units has been most pleasant and profitable -- for the truck is all good that can be said of it -- then we know the Federal organization behind their product -- this also means much to the perspective buyer and contented Federal owner.

In this particular section road conditions are most severe on motor trucks -- grades steep -- much mud -- but in no instance have we hesitated to guarantee a Federal for any and all classes of transportation -- it is indeed a satisfaction and safe feeling to know your units -- your organization -- and to be able to make such strong recommendations of your selling product. We are always striving and looking forward to GREATER FEDERAL YEARS and beg to be believed,

Yours most faithfully,

NORTHWESTERN MOTOR SALES COMPANY

J. M. Wheeler
President

WORM DRIVE MOTOR TRUCKS FEDERAL TON AND HALF and 3½ TON MODELS

# FEDERAL Motor Truck Company

**122-130 Leavitt Street** **Detroit, Mich.**



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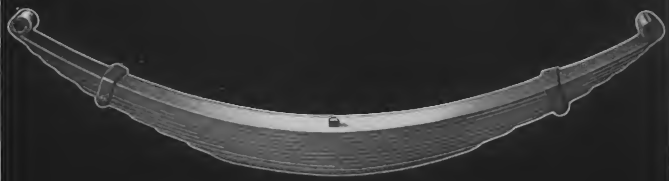
# "The Spring Is the Thing"



## MATHER

Scientifically Heat-Treated

## SPRINGS

designed to insure

## Maximum of Elasticity and Endurance

with

## Minimum of Vibration

Genuine made only by

## The Mather Spring Company

Toledo, Ohio

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HEREWITH is shown an ideal mounting for ball bearings in the wheels of a full floating type of rear axle.

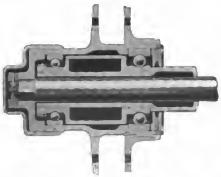
The same inherent characteristics that designate ball bearings as the superior anti-friction device in various other adaptions also obtain in ball bearing wheel mounting—namely, ample carrying capacity and an almost negligible coefficient of friction.

It is also important to note that the starting coefficient of friction in ball bearings is practically the same as the coefficient of friction in motion. In other words, at the moment of starting a car from a position of rest the coefficient of friction in ball bearings is practically the same low figure as it is when the car is fully in motion.

Obviously, this elimination of a high resistance to starting is an important consideration in an ideal wheel mounting.

## The Hess-Bright Mfg. Co.

**Philadelphia, Pa.**



HESS-BRIGHT BALL BEARINGS ARE PATENTED



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# Free Truck Tire Offer Renewed For Six Months

Thousands of truck owners have taken advantage of this amazing offer since it was announced the 1st of last April. But many users were not in need of tires and so could not accept it during this time. For this reason we now extend this offer to April 1st, 1916. Now every owner can have this chance to prove —without risk—that the S-V is best.

*Equip opposite wheels—at the same time—one with a Goodyear S-V, one with any other standard Truck Tire of like rated size, bought in the open market. If the Goodyear S-V fails to cost less per mile than the other, we will return you its full purchase price, making the S-V free.*

Get this guarantee in writing when the tires go on. Equip all the wheels you wish. Compare the Goodyear S-V with every seeming rival in this convincing way. Then you will end all your costly experimenting. Then you will know the truth.

## Mileage Warrants Foolish

The habit has been, with us and with others, to give mileage warrants on Truck Tires. But that's unfair, either to you or us.

Small tires can't do what big tires do. No tire on hard roads can match good-road mileage. A mileage warrant is a simple guess on average conditions. And it must be low enough to meet bad situations.

What we can do—what we do—is to guarantee the lowest cost per mile under like conditions. We guarantee that on the Goodyear S-V, against any tire that's built.

Not alone in the limited, cautious way in which mileage is usually guaranteed. Not only on an adjustment basis. The Goodyear S-V is entirely free, however long you use it, if any tire you match against it shows as low a cost per mile.

### Why We Dare

We dare do this because we have already made 5000 tests and comparisons. Barring accidents, the Goodyear S-V will surely win against any rival Truck Tire. There are reasons for it. One is more available tread rubber. Another is no creeping, no bulging or breaking, no possible separation. The tread, the backing and the rim are one.

Our local branch will tell you where to get the S-V tires under this signed warrant.

GOODYEAR
AKRON, OHIO
S-V Truck Tires

**THE GOODYEAR TIRE & RUBBER CO., Desk 86, AKRON, OHIO**
Makers of Goodyear Fortified Automobile Tires
We Make Demountable, Block, Cushion, Pneumatic and Other Types of Truck Tires



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Advertisements

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# We Promised it—Here it is

In this issue 26 pages are devoted exclusively to the discussion and analysis of problems in department store package delivery and allied subjects.

Every line of matter on these pages was prepared from direct investigations made by our own representatives and every word has been written by the staff.

We have taken nobody's word for it. The best is no better than we owe to our readers.

We want you to understand that this is not a special issue, but merely a regular issue in which department store problems are given the prominent place appropriate at this season.

Primarily intended for the assistance and information of the user of dry goods trucks, this issue will also prove highly informative to the dealer who is dealing with these same men.

MORE to follow in later issues.

The COMMERCIAL VEHICLE
READ BY BUSINESS MEN
239 West Thirty-ninth Street
New York City



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John Wanamaker Owns 121 Autocars

**No Sir! Our Horses Are Not Going to War**

We have only 208 now! One after the other of 888 of our horses in New York and Philadelphia have had to go to other employments, being superseded by our more rapid automobiles and trucks.

We cannot consent for the faithful dumb beasts in our stables to be packed in a ship and transferred to a battlefield.

Having always approved the work of the Society for the Prevention of Cruelty to Animals we are constituting ourselves a society to keep these good old horses out of the wars.

The good old days of horses for work and pleasure are passing—

The four strong legs are giving way to the four swift wheels—

But our sixty passenger elevators are in a sense flying horses carrying at once a dozen persons or more and doing it all day long from the street floor to the upper floors instead of the old-fashioned climbing of the staircases which customers had to do formerly.

These are the better days for shopping and this store grows in its attractiveness and usefulness.

[Signed]

John Wanamaker

August 31, 1915

*From the John Wanamaker daily advertisement*

OVER his own name, the man who has blazed the way of efficiency in distributing merchandise calls the motor truck "The Four Swift Wheels" of commerce.

The Autocar has supplied "The Four Swift Wheels" to more than 2600 American business houses.

John Wanamaker is one of the country's merchants that pay tribute to the reliability and economy of the Autocar by using them in large fleets.

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The COMMERCIAL VEHICLE
Read by Business Men

Vol. XIII October 1, 1915 No. 5

# Motor Delivery in Department Stores—Methods and Problems

## Investigation of Conditions in Dry Goods Houses All Over the Country Shows How Trucks Have Been and May Be Made Efficient

DEPARTMENT stores have accepted motor delivery as indispensable to the modern dry goods business. Not alone the great emporiums of the metropoli, but in the substantial cities all over the country.

That horses are mere pensioners in the outfits of the big establishments of New York, Chicago, Philadelphia, Pittsburgh and Boston is not surprising, nor is it particularly enlightening; but that stores in Arizona, in Idaho, in Maine and North Carolina are using trucks for more than half of their work, that in a group of stores all over the country, picked at random, the great majority were users of commercial motor vehicles is worthy of thought.

### Conditions Differ

The conditions under which trucks in the use of the smaller dry goods stores must operate differ materially from those under which the big city trucks run. The nation trades in these stores, not in the great institutions of Field, Wanamaker, Lord & Taylor and Filene.

Covering seventy-five cities in all sections of the country, an investigation has been conducted by THE COMMERCIAL VEHICLE, the purpose of which is to determine the prevailing facilities and methods used by department stores in the delivery of packages to their customers, with analyses of problems and suggestions for improvement. Altogether, 300 inquiries were made.

These stores were all located in cities of over 25,000, with one exception, and included no city larger than St. Louis, Mo. Stores in New York, Chicago, Philadelphia, Pittsburgh and Boston were not considered in this investigation, for the problems of the larger stores are radically different from those in smaller centers and the methods quite distinct.

### Motorization General

The extent to which department stores have motorized is indicated by the fact that of all those whose answers were complete enough for analysis, only 12½ per cent did not use motor trucks. Both horses and motor trucks were used by 43½ per cent of this number, and another 43½ per cent did not own any horses. Thirty-six per cent were without wagons, the reason for the discrepancy of 9½ per cent having wagons but no horses being that many of these have only lately disposed of their horses, and still retain the wagons for reserve.

To total the above percentages will not give a balance of 100 per cent because some of the percentages overlap. However, they show that some 87½ per cent are users of trucks as against only 56 per cent who employ horses or mules. Of the total, 44 per cent use motor trucks exclusively as against only 12½ per cent exclusive horse users.

The above figures, furthermore, do not include an additional number of stores which do not maintain delivery equipment of their own, but have the delivery done by contractors or by co-operative delivery arrangements with other stores. These, added to the group above, constitute 9 per cent of the combined total.

The average store may be said to have a mixed delivery fleet with six motor trucks, a dozen horses and eight wagons. Two of these trucks are of ½-ton capacity or less, two more are of ¾-ton size and the other two are heavier trucks. The horses either are run in teams on four of the wagons and in single harness on the other four, or else they are mostly driven single and changed at noon. This deduction is based upon the fact that the average mileage made by the horses is 18.

Truck mileage averages 48 per day.

### What Each Truck Does

This equipment suffices for the delivery of 882 packages to 591 addresses each day. Assuming that the horse mileage figures are based on the mileage made each day by the wagon, as is usually the case, the average daily mileage of all the vehicles is 288 miles by truck and 144 miles by horse wagon, a total of 432 miles. Each truck, therefore, is the equivalent of two wagons and three horses.

These figures, in connection with

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Reading
Allentown
Bethlehem
Easton
Scranton
Wilkes-Barre
Pittsburgh
Altoona

three-fourths per cent hire extra trucks and no horse wagons, and one store employs wheel boys.

### Problems to Be Met

Complacency is by no means general, although 26 per cent report that they have no problems perplexing them. Ninety-six different problems were reported by the stores which contributed to the inquiry, most of them original. Bad roads and mechanical difficulties were complained of by 22 per cent of these; 8½ per cent complained of wrong addresses, 7 per cent of tires, 5½ per cent of delays in collecting for C. O. D. packages, 4 per cent bemoaned delays incident to calling for goods to be returned, and 4 per cent grumbled at special delivery drivers, and the rising cost of delivery, respectively. These complaints, which ones total 85 per cent, but they do not represent this portion of the total stores reporting. As a general rule these users are well satisfied with the trucks themselves, and are mainly concerned with means of avoiding the vexatious delays that result from the thoughtlessness of patrons, the carelessness of employes and defects in systems and arrangements that prevent the trucks from working to their fullest possible effectiveness.

### Sectional Differences

The data secured differs greatly in its nature according to locality. In the southern section, the use of motor trucks is less pronounced than in the eastern and middle western sections. West of the Mississippi, more of the firms reporting were without horses than with them. In the Pacific northwest and in California horses are almost unknown in department store work.

Heavier vehicles prevail in the middle west than in any other section, the mountain and desert states using very light trucks by reason of the poor street conditions which prevail in many of these cities and because of the hills. Electries are used principally in the larger cities, where charging facilities are good and where there is sufficient work of medium haul lengths to warrant special vehicles for it.

### Longer Hauls in Larger Cities

In delivery radii, the large cities excel the smaller ones uniformly, due to the greater area occupied by such cities. Loading methods are generally superior in the New England and far western portions of the country than in the southern and central regions.

A complete tabulation of the results of the investigation is given at the top of this page. Most notable among the conclusions to be drawn from the data available are the following:

## Results of Investigation of Dry Goods Delivery Methods in American Cities

Number of cities represented..... 75 Sections of country represented.....All
Number of states represented..... 36 Sizes of cities.....17,000 to 735,000

| Items | Average | Maximum | Minimum |
|---|---|---|---|
| Packages per day | 882 | 4,500 | 86 |
| Deliveries per day | 591 | 9,000 | 85 |
| No. trucks used | 5.8 | 30 | 0 |
| No. horses used | 12.3 | 68 | 0 |
| No. wagons used | 8.4 | 55 | 0 |
| Radius of delivery in miles | 9 | 25 | 2 |
| Trips per day: | | | |
| In central section | 3 | 20 | 2 |
| In residence section | 3 | 8 | 2 |
| In suburban section | 2 | 4 | 1 |
| Mileage per day: | | | |
| Trucks | 48 | 100 | 16 |
| Horses | 18 | 33 | 8 |

| | |
|---|---|
| Stores without trucks | 12½ per cent |
| Stores without horses | 43½ per cent |
| Stores without wagons | 36 per cent |
| Stores with mixed equipment | 43½ per cent |
| Stores using co-operative delivery | 9 per cent |
| Stores maintaining own equipment | 91 per cent |
| Capacities of trucks: | |
| ½-ton | 49½ per cent |
| ¾-ton | 33⅓ per cent |
| 1-ton | 5⅓ per cent |
| 1½-ton | 7½ per cent |
| 2-ton | 3⅓ per cent |
| Extra vehicles secured for rush work: | |
| Renting trucks | 16⅔ per cent |
| Renting horses only | 5½ per cent |
| Renting horses and wagons | 36 per cent |
| Renting both trucks and horses | 21 per cent |
| Hiring bicycle boys | 1½ per cent |
| Do not need outside help | 21 per cent |
| Loading methods: | |
| Over sidewalk | 44½ per cent |
| In alley | 37½ per cent |
| In a court | 16⅔ per cent |
| In a bay | 1½ per cent |
| In the basement | 1½ per cent |
| In the garage | 4½ per cent |
| On warehouse floor | 1½ per cent |
| In open lot | 1½ per cent |
| Stores using recorders on trucks | 50 per cent |
| Stores not using recorders | 50 per cent |
| Stores employing helpers on trucks | 72 per cent |
| Stores not employing helpers | 28 per cent |
| Problems: | |
| None | 26 per cent |
| Mechanical | 11 per cent |
| Bad roads | 11 per cent |
| Wrong addresses | 8 1/3 per cent |
| Tires | per cent |
| C. O. D. packages | 5½ per cent |
| Return calls | 4 per cent |
| Special delivery packages | 4 per cent |
| Drivers | 4 per cent |
| Expense | 4 per cent |

### The Suburban Market

Approximately half the business of department stores is gotten from the outlying residential and suburban territory, which today must be given service nearly as good as that afforded in the closely built-up and apartment-house sections. To give such service necessitates the use of motor delivery cars.

In many cities, thanks to improved transportation means by trolley extensions, improvements in railway suburban service, the more extensive use of private motor cars and last, but by no means least, especially in the extreme west, the development of bus lines; the better class of trade is moving from the congested portions of the city, so that hauls are getting longer and an increasing part of the business is drawn from the more remote neighborhoods.

All this points to the increasing use of motor delivery equipment.

### Better Internal Systems

This development is also necessitating better internal systems for the handling of packages before they are loaded into the trucks. Customers are demanding delivery in a shorter time, more frequently and over greater distances. Once such service has been given, customers are never satisfied with anything less. By cutting the idle standing time, department stores find that they are able to give this

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Fleet of thirty-five Whites owned by the Rosenbaum Co., Pittsburgh, Pa.

improved service without using more vehicles or enlarging the shipping room facilities.

### Smaller, Swifter Chassis

In actual delivery, too, this state of things is making itself felt. The greater distances to be covered and the higher speed required is bringing the lighter types of trucks into greater use. The erstwhile 1,500-pound package car and 1½- to 2-ton furniture or grocery truck are giving way in some sections to the 750- to 1,000-pound package vehicle and the 1- to 1½-ton furniture and grocery vehicle. This is because the smaller vehicles may be operated on pneumatic tires, thus making higher speed safely and economically, and because on routes where greater road speed is required the stops per mile are fewer, so that the loads are lighter.

### The Special Delivery Problem

Formerly special delivery did not constitute such a problem as today, principally because the mileages required were not as high. Today the erstwhile bicycle boy will not do. The motorcycle carrier has been found useful only where road conditions are fairly good.

There is a demand, as yet not very definite, but growing, for a light delivery car of even smaller size than the ubiquitous Ford. A vehicle on pneumatic tires, with low suspension, capable of 40 miles an hour or better, low in price and simple, to carry a load of not more than 500 pounds. Motorcycle makers are anticipating this demand and some of the light car builders have prepared for it.

One of the most perplexing problems in the dry goods delivery field today is the fluctuation of the volume of deliveries. Department stores find it necessary to make sure of sufficient equipment to cope with the greatest rush periods to be met with, but aim to avoid at all hazards the maintenance of expensive equipment in idleness.

Not only does the amount of business vary as to season, but as to days of the week. Each holiday means a stimulation of buying which is reflected in the delivery department.

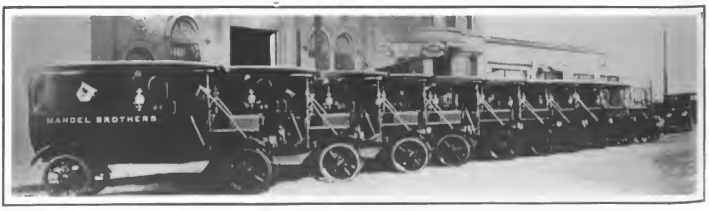
In the old days this problem was not so perplexing, for the stops were not so far apart. Transportation was a minor factor. The main thing was to get enough jumper boys to make the actual house-door deliveries, and extra boys could be crowded on as needed. Today, however, this extra work means extra travel, and that means extra horses and wagons, if these are used. By working overtime, two shifts of horses will permit one wagon to do a greater amount of work, but this costs money, and extra animals cannot always be rented easily.

### The Solution

Motor vehicles, however, offer a happy solution to this problem, for they are able to travel the whole route without fatigue, regardless of its length. They may be operated any number of hours, and no return to the store for a fresh animal is necessary. Like the old horse scheme before the time of four-a-day delivery and suburban service, extra jumper boys may be piled on and with a properly-arranged route, one driver may easily do double the normal amount of work.

### The Special Delivery Answer

Much of the special delivery difficulty, too, which is perplexing to many southern and middle western delivery superintendents, can be eliminated by the judicious use of motor delivery. Those stores which make the most and the best use of motor commercial vehicles have found that the improved service which can be given eliminates much of the necessity for special delivery.




Ten specially-built Waverley delivery trucks used by Mandel Bros., Chicago. The dummy hoods in front house a portion of the battery, enhance the appearance and place the cab where it is more accessible than between the wheels as is usual with electrics

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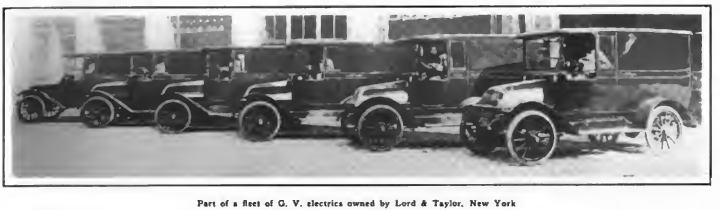

Part of a fleet of G. V. electrics owned by Lord & Taylor, New York

Customers who have been educated to expect New York City delivery in Des Moines, Ia., will not wait for the daily wagon to arrive some time between 11:00 a. m. and 10:30 p. m. the day after the goods is purchased—hence the special delivery difficulty.

### Wasteful Competition

Lack of full loads is a serious condition being faced by many delivery managers. It is a common sight to see three or four delivery trucks from as many competing stores jostling one another on the same street, giving neighbors, and often the same buyers, the service they demand, each of which truck carries but a fraction of a load, and probably has to wait at the store for a sufficient load to make a trip worth while.

Co-operative and contract delivery has been resorted to in some cases as a remedy for this condition, these several stores combining their delivery departments and covering each of the routes with but one truck instead of a fleet, each truck having a full load and a busy, efficient crew.

This scheme, however, has its drawbacks and limitations, as it robs the store of the valuable advertising value of the trucks and the individuality of exclusive delivery. It is also difficult to divide the expenses between the different parties to the agreement. Greatest of all objections, however, is the extreme difficulty of getting rival stores to combine.

Today service is the greater part of competition. To the department store, service means more than anything else, prompt delivery. If a store has a better delivery system than its competitor it is extremely unlikely to relinquish this advantage for the sake of a saving in delivery cost. If it has not, it may expect to some day, and with the prevailing jealousy between dry goods stores, not only in the same cities, but in those far removed, it is very difficult for a store to determine whether it has the most efficient or the least efficient in its locality.

### Bulky Goods Troublesome

Groceries, furniture, carpets and linoleum, if handled by department stores greatly complicate the delivery problem. Groceries are heavy, furniture is bulky and floor coverings unwieldy. Bicycles and childrens' vehicles are frail and inconvenient to handle. Articles of this nature must usually be delivered at the rear door, whereas dry goods, in the hands of a well-uniformed deliveryman, are acceptable in the front of most homes.

### Some Suggestions

Solutions of this problem at best are only partial, but are worth considering. First of all, a department store that sees to the proper uniforming of its deliverymen and washing of its trucks, even in smaller centers will save itself much delay on the delivery end. Most housewives are pleased by the appearance of a neatly-garbed boy and a well-kept truck at their doors, but will send a dirty, ill-kempt fellow to the rear. They will make more of an effort to save delay in the former case, when they are mildly flattered, than in the latter, when they are unconsciously, perhaps, affronted.

If the amount of bulky goods is not great, one vehicle of greater capacity than the ordinary delivery cars can handle it on several routes because of its superior speed, leaving the regular trucks to deliver dry goods only.

If these classes of merchandise represent any considerable quantity special bodies may be built with movable partitions across, so that the parcels may be placed in the forward portion of the truck and bulky goods behind. Racks at the

(Continued on page 41)

Some of the Mandel gasoline vehicles, in this case Whites. The four big trucks in the background are of 1½-ton capacity and are used for furniture delivery. The other are 1,500-pounders for package delivery and mounted on pneumetic tires for speed

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# Rush Buying Seasons and How Big Department Store Survive Them With Motors

## Spring, Fall and Holiday Peak Loads Are the Test of Dry Goods Delivery Efficiency—Methods Differ

PEAK LOADS in the department store trade must be handled efficiently inside of the store if the delivery vehicles outside are to be a success. There is a certain and well-defined relation between the handling of the peak-load packages inside and the final delivery by the vehicles outside so that the solution of the peak-load problem consists of two parts, one inside of the store and the other without.

### Three Peak Loads per Year

Peak loads occur generally at three times of the year, during October, in the Christmas shopping season and at Easter. The peak load at October is due to the return of a large percentage of a city's people from their summer vacations, during which time they have not purchased much goods and must therefore outfit themselves for the coming winter months. The purchase of gifts during the holiday season naturally makes this time of the year a busy one, for people are then buying for others as well as themselves.

At Easter, people generally begin to purchase goods for the coming spring and summer months and this causes a peak load, which while not as large as that of the Christmas holidays, is still considerably above the average. Of course, besides these three peak-load periods, there are others caused by weekly or monthly furniture or white goods sales, but the problems encountered in handling the greater number of packages inside the store and their final delivery out of it are the same.

The solution of the peak-load problem inside of the store is simpler than that outside of it for the reason that in stores which have modern conveyor systems of handling the packages, these are usually designed to take care of the maximum load and necessitate only the hiring of additional help to carry the goods away from the mechanical units of the system.

Where spiral gravity chutes are used to take the goods from the various floors to the shipping room and belt conveyors to distribute it to the sorting bins, these are generally of sufficient size and capacity to handle all the goods, even during the busiest seasons.

### Internal Delays Hold Truck Idle

It is the stores which still transfer their goods from the various floors to the shipping room in hampers using elevators to get them there that the peak-load seasons offer serious problems, for then, not only are the goods delayed in reaching the shipping room due to the crowds on the sales floors through which the hampers must be wheeled, but the delivery vehicles are kept idle due to the internal delays.

In cases of this kind the addition of more boys pushing more hampers in order to handle the greater volume of goods will not solve the problem, but make it worse, because of the greater resultant congestion. Some stores make the shipping room force, including the hamper-pushers, work several hours after the store has closed in rush seasons, in order to catch up with the volume of packages which has collected. This is but a poor means to an end, for with the sudden rush of goods to the shipping room at one time, confusion, and therefore a lack of efficiency, is sure to result. The real solution of problems of this kind are the use of some mechanical means which is capable of handling the maximum expected load.

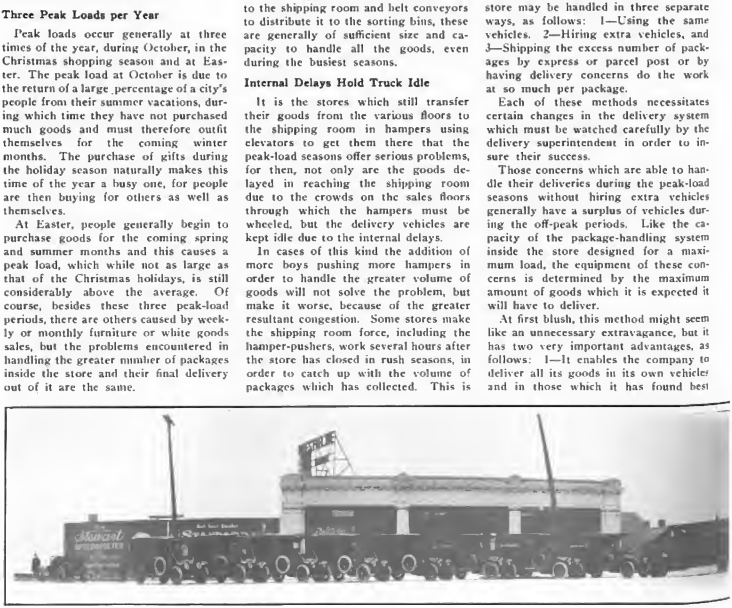
### How Peak Loads Are Handled

The peak-load problem outside of the store may be handled in three separate ways, as follows: 1—Using the same vehicles. 2—Hiring extra vehicles, and 3—Shipping the excess number of packages by express or parcel post or by having delivery concerns do the work at so much per package.

Each of these methods necessitates certain changes in the delivery system which must be watched carefully by the delivery superintendent in order to insure their success.

Those concerns which are able to handle their deliveries during the peak-load seasons without hiring extra vehicles generally have a surplus of vehicles during the off-peak periods. Like the capacity of the package-handling system inside the store designed for a maximum load, the equipment of these concerns is determined by the maximum amount of goods which it is expected it will have to deliver.

At first blush, this method might seem like an unnecessary extravagance, but it has two very important advantages, as follows: 1—It enables the company to deliver all its goods in its own vehicles and in those which it has found best



A few of the White trucks owned by

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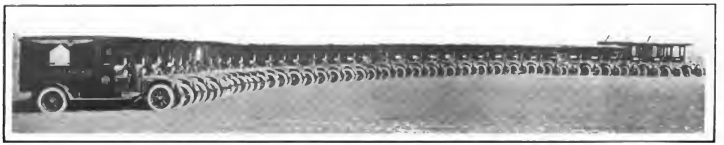

Part of the forty-three-truck fleet of Whites operated by Kaufmann & Baer, Pittsburgh, Pa.

suited to the work, which would not be the case if additional ones had to be hired. It also keeps the deliveries under the direct supervision of the company's own delivery superintendent, which would not be the case were they sent by express or delivered by an outside concern; 2—The surplus of vehicles enables the company to give each one of its fleet a thorough and unhurried overhauling once a year, most of the work being done during the slack months and the surplus trucks put into service to take the place of those being overhauled. The overhauling is so arranged as to be completed before the rush or peak-load seasons set in, so that at those times all of the vehicles are ready for work.

### Gimbel Bros. Have Surplus Trucks

Gimbel Bros., in New York City, with its monster fleet of 138 trucks, made up of eighty-five electrics and fifty-three gasoline trucks, has a surplus of twenty vehicles. The fleet is as follows: Six 3½-ton Studebakers, six 1¼-ton Studebakers, twenty-seven ¾-ton Studebakers, four ¾-ton Lansdens, four ½-ton Lansdens, thirty-eight ½-ton Studebakers, all electrics, and a fleet of Whites made up of forty ¾-tonners, ten 1½-tonners and three 3-ton units.

By reason of this surplus, each unit of the fleet is actually rebuilt once every year, as reported in THE COMMERCIAL VEHICLE of March 15, 1915. Gimbel Bros. have found this system much less expensive than tinkering with the vehicles on and off during the year and the number of help calls received from trucks out on their routes and out of commission has been reduced by more than 400 per cent.

### How Wanamaker Handles Peak Loads

Wanamaker's, in Philadelphia, also makes all of its deliveries during the peak-load seasons with the same number of vehicles with the exception of the number of horse wagons in use. That concern's fleet is made up of twenty-five Fords, eighty Autocars, six 3-ton Packards for transfer work, twelve 1,000-pound C. T. electrics and on an average of 100 horses.

Ordinarily about 40 wagons are in use, but in the rush season the number is raised to fifty, the maximum with two horses to the wagon. These extra wagons take care of the varying volume of goods to be delivered on the same routes on different days, acting as a buffer between the maximum truck capacity on one route and another trip over a portion of the same route.

The same method is followed in Wanamaker's New York City store, which has the same equipment as the store in Philadelphia with the exception of the twelve C. T. 1,000-pound electrics, none of this type being used there.

Kaufmann & Baer's store in Pittsburgh, Pa., also makes all of its peak-load deliveries with its regular motor truck equipment, which consists of thirty-five 1,500-pound Whites, eight 1½-ton Whites and four horses.

Lord & Taylor, New York City, is another of the large department stores which makes all of its peak-load deliveries with its own vehicles. That concern operates forty-five electrics and thirteen gasoline trucks of its own in addition to sharing the use of twenty-one gas vehicles owned by the Eleto Co., a subsidiary concern, with James McCreery & Co., another department store. The Lord & Taylor fleet is made up of two 2-ton G. V. electrics, forty 1,000-pounders of the same make, thirty-four of which are worm-driven and have special limousine bodies and French hoods; two 1,000-pound C. T.s, one 1,000-pound G. M. C., one 5-ton White, eight 2-ton Pierce-Arrows, two 2-ton Alcos and two six-cylinder Pierce-Arrow passenger cars rebuilt and fitted with delivery bodies.

The Eleto fleet consists of one 5-ton White, seven 1,500-pound Whites, twelve rebuilt Pierce-Arrow passenger car chassis and one rebuilt Packard passenger car chassis.

Of this total of seventy-nine trucks, twelve to fourteen may be considered surplus during the off-peak periods.

### How Trucks Are Operated

While each of the above department stores does not hire extra vehicles to make all of its deliveries in the rush season, each operates its trucks in a somewhat different manner than during the off-peak periods, due to the vastly greater number of packages which must be delivered.

These differences consist of rearranging certain of the routes in the peak-load intervals; of running a greater number of trips per day, with consequently longer working days, and of the use of a helper on the truck where none is used in the off-peak seasons or of two helpers when one is used during the remainder of the year.

The rearranging of certain of the

the Jos. Horne Co., Pittsburgh, Pa.

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routes to more evenly distribute the work among all of the vehicles depenus mainly upon the personal supervision which the delivery superintendent gives the problem. For instance, the John Wanamaker store in Philadelphia is constantly changing its routes. On some days three trucks may be put on two of the regular routes. On others, one horse wagon working on the store-end of a route, may be sufficient to enable the truck to deliver its excess load of packages in the same time as usual.

No definite rule can be given upon the best manner in which to split or rearrange routes, for much depends upon the peculiar conditions surrounding the deliveries in different cities. It is self-evident, however, that this one phase of the peak-load problem needs the strictest attention by the delivery superintendent. He must know his delivery territory thoroughly and also the possibilities of his equipment. It is a matter of personal ability.

Gimbel Bros., in New York City, split some of their routes into two parts with one truck on each, when the volume of goods to be delivered on that particular route will keep two trucks busy for the whole day. On others, where the excess to be delivered on four adjacent routes is small, a small portion of the territory will be taken from each and made into a separate route for a fifth truck.

### Body Size Important

Much depends upon the size of the body mounted on the trucks as to whether the same number of vehicles can handle the great excess of packages in the peak-load times. If the average loads only fill a small portion or a half of the body, it is then easy enough to load them full in the rush seasons and either use an additional helper to get rid of the goods quickly or make an extra trip. When the bodies are loaded full under average conditions, however, it is imperative that another trip be made per day or other outside vehicles called upon to assist in the work.

Gimbel Bros., New York City, use 6- by 4½- by 5-foot bodies on their 1,000-pound electrics and 6½- by 4½- by 5-foot bodies on their 1,500-pound gasoline trucks, which are slightly more than half filled under ordinary conditions. Lord & Taylor use a 6- by 4- by 4-foot body on their 1,000-pound electrics. These bodies are of the limousine type and therefore have slightly less load-carrying space than the conventional panel type department store body. Under ordinary conditions these bodies are only half filled but in the peak-load seasons are full.

### Two Helpers on Truck Save Money

The use of a helper on the truck during the rush season, if none were used the remainder of the year, or two in place of one, often makes the difference between one and two trips per day. When properly worked, the driver with two helpers can deliver a surprisingly large excess of goods, especially if he delivers some of the goods himself and keeps the helpers on the jump, cutting across lots to meet the driver at some predetermined point.

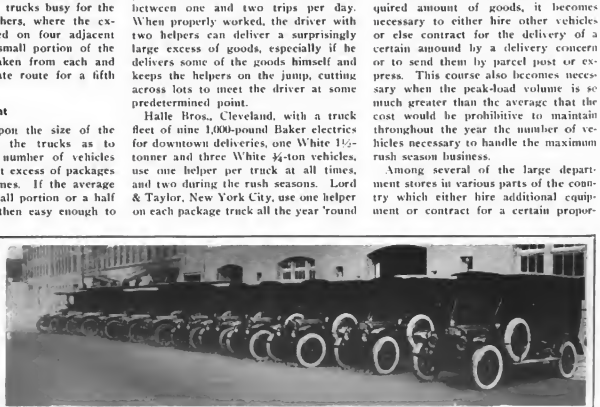
Halle Bros., Cleveland, with a truck fleet of nine 1,000-pound Baker electrics for downtown deliveries, one White 1½-tonner and three White ¾-ton vehicles, use one helper per truck at all times, and two during the rush seasons. Lord & Taylor, New York City, use one helper on each package truck all the year 'round with two at the peak-load periods. Each of the helpers of that concern must take out a driver's license as soon as he is competent. The helpers are used to drive the surplus vehicles put into service during the rush, and green helpers hired to fill their places. The May Co., Cleveland, also uses one helper on its package delivery trucks all the time and two during the holiday seasons.

### When Extra Trucks Are Needed

The making of one or more extra trips per truck per day depends upon whether or not the truck with two helpers can get rid of the goods in the usual allotted time. If not, another trip must be made and on some occasions, like Christmas Eve, trips are made long after the time Santa Claus is supposed to arrive. The quickness of the service required, often judged by what a competitor offers, determines the number of extra trips to be made after the completion of the regular working day.

When continued manipulation of routes, longer working hours, and one or two helpers per truck will not enable a delivery equipment to handle the required amount of goods, it becomes necessary to either hire other vehicles or else contract for the delivery of a certain amount by a delivery concern or to send them by parcel post or express. This course also becomes necessary when the peak-load volume is so much greater than the average that the cost would be prohibitive to maintain throughout the year the number of vehicles necessary to handle the maximum rush season business.

Among several of the large department stores in various parts of the country which either hire additional equipment or contract for a certain propor-



Some of the fifty-four Whites operated by Gimbel Bros. lined up in front of the New York garage

Detroit electrics owned by Carson-Pirie-Scott & Co. Chicago, in front of their garage

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tion of their peak loads are Marshall Field & Co., Chicago; Jordan-Marsh Co., Boston, Mass.; Halle Bros. and the May Co., of Cleveland, O.

Marshall Field & Co., the world's largest department store, at the present time has a fleet of trucks numbering 231. Of this number, 174 are small G. V. and Walker electrics, twenty-seven of the latter make of 750 pounds capacity having been purchased this year. The gasoline truck fleet consists of eight ¾-ton Whites, one 1-ton Federal, three 1-ton Macks, five 1½-ton Whites, two 1½-ton Packards and thirty-eight 3-ton Packards.

### Marshall Field Hired 139 Trucks

During the last Christmas rush the volume of packages to be delivered was so great that no less than 310 trucks in all were required to deliver all the goods promised on Christmas Eve. At that time the Marshall Field fleet numbered 171, so that 139 trucks were hired that Santa Claus might keep his promises to many of Chicago's families. This monster fleet, the largest ever recruited by a department store, was operated at full pressure, as reported in THE COMMERCIAL VEHICLE of January 15, 1915, from 6:00 a. m. to midnight before all the deliveries were made. The packages were delivered over a radius of 40 miles maximum. They were carried from the main store and the warehouse to six sub-stations from 7 to 13 miles out by 3-tonners and then unloaded into lighter vehicles for the final delivery. Two and sometimes three helpers were used per truck, but even then the final rush at the store was so great that while the regular number of trucks had been able to fairly keep apace of the deliveries in the week preceding Christmas, they alone would have failed utterly without some outside aid.

### Jordan-Marsh Uses Expressmen

Jordan-Marsh Co., in Boston, delivers a large percentage of its peak-load packages in the suburban districts by means of local expressmen who drive their vehicles to the store to get them. As reported in THE COMMERCIAL VEHICLE of June 15, 1914, the Jordan-Marsh company has a special room set aside in which these packages are routed according to the particular truckman who is to make the delivery. In the ordinary off-peak periods, these expressmen only deliver to destinations not served by the company's own vehicles. The latter average 100, of which twenty-two are motor trucks, twelve 1½-ton Autocars, three 3-ton Packards, and four 14000-pounders, three G. V. electrics and one C. T. electric.

### Halle Bros. Hire Trucks

Halle Bros. also hire motor trucks to handle their peak loads. The drivers for the extra vehicles are generally recruited from the ranks of those regular helpers who have drivers' licenses and green helpers put into their place with experienced drivers. When this cannot be done drivers are furnished by the concern supplying the trucks, although this method is not as satisfactory as the former because the helpers are better acquainted with the routes and can therefore make better time by taking short cuts and avoiding obstacles known to be in the way.

At least one helper and sometimes two are supplied on each truck, the small cost of an extra helper having been found to be more than offset in the idle waiting time saved the truck. These vehicles are generally put on split routes, but are also placed on entirely new routes made up of portions of two or three routes, if the condition of business lends itself to this method of procedure.

The May Co. hires extra trucks during the month preceding Christmas for hauling packages from the main store to all of the five sub-stations maintained in the suburbs. These are generally 5-tonners with large bodies to accommodate as near that weight of packages as possible.

### Uses Trailers in Transfer Work

The May company fleet is made up of thirty trucks and twenty horse wagons, the latter being used for the deliveries in the down-town section of the city. The truck fleet consists of fourteen ¾-ton Whites, one Baker ¾-ton electric, three 3-ton Alcos and twelve Grabowskys, some of which are ¾-tonners and the others of 2 tons capacity.

Except on rare occasions the package trucks with two helpers are able to handle the peak loads, but when this is not the case relief trucks are hired with drivers and experienced helpers sent out with them.

The May company has just purchased three Detroit two-wheeled trailers of 1,500 pounds capacity each, with which it expects to eliminate the necessity of hiring outside vehicles to aid in the transfer work. The value of these trailers is especially noticeable when the transfer load to be carried to any one sub-station is just above the amount which the ordinary truck can carry, and which therefore would require the truck to make a second trip with only a part

A few delegates from John Wanamaker's Autocar army posed in front of the New York garage

B Alaman & Co., one of New York's most exclusive stores, consents to have its Whites pose before the camera

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load in order that the customers whose packages happened to be in the excess load would not be disappointed on the day following. By hauling one of the light trailers with the excess load, only one trip of the truck is necessary.

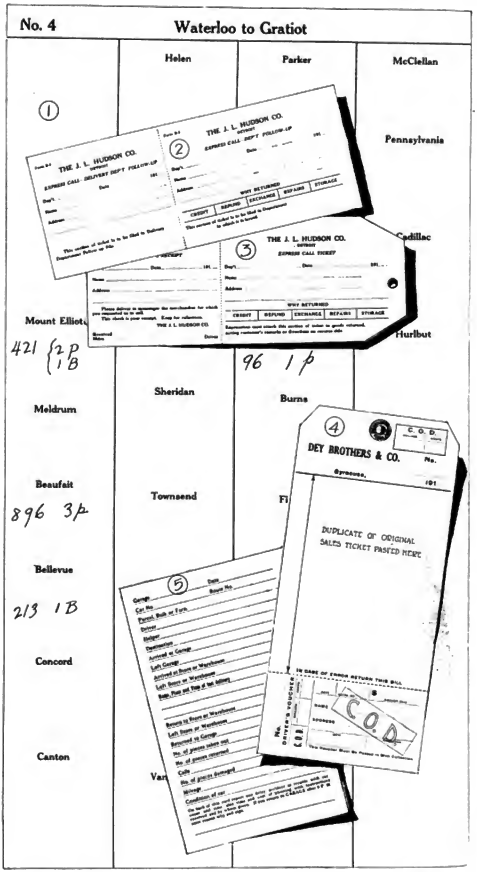
### May Co. Uses Big Bodies

Another important feature of the May company's delivery equipment is the type of body used. This is of the screen-sided type with rectangular-shaped side-wings 12 inches deep and 12 inches wide. Both packages and a certain amount of the bulky goods are carried in these vehicles, rugs, bicycles and such material being carried in the side-wings and lashed to the screened sides to prevent them from falling off while the vehicle is in transit. The use of the side-wings and the carrying of bulk goods going to the same or adjacent destinations as the packages, enables these trucks to average 1,000 pounds or more per load, even during the off-peak periods while the capacity of the vehicles themselves is but 1,500 pounds.

Another angle of the peak-load problem is the psychological effect on the vehicle drivers as seen from their standpoint. In practically every store there is a certain amount of overtime work to be done by the drivers, no matter whether extra trucks or horses are hired or not. While it is somewhat difficult to determine just what rate of pay a driver and his helper should receive for this overtime work, it is generally conceded that some form of remuneration must be paid. The great majority of the stores pay no actual cash for this overtime work during the holiday rush, but allow the driver and helper 1 or 2 weeks vacation with pay during the slack season during the summer. The Lord & Taylor store is in this class, although it does provide supper money for both driver and his one or two helpers if the truck is out after 8 p. m. Halle Bros. use the same method.

### Lit Bros. Give Drivers Extra Pay

Lit Bros., in Philadelphia, use a clever system which insures against paralyzing the activities of the store at the critical holiday season by any of the drivers leaving. This system consists of the presentation of extra pay on Christmas Eve to those drivers who have done efficient work during the rush. Those who have been in the employ of the company from 1 to 3 years are given 1 week's salary, and those whose term of employment is over 3 years, 2 weeks' salary. As Christmas Eve marks the end of the holiday rush, the prospect of a reward which can be won in no other way prevents the drivers from leaving when the work runs into the wee small hours of the morning and the vehicles must be loaded to overflowing.




Forms used by several department stores in various parts of the country to increase the efficiency of their motor vehicles. 1—Driver's delivery card used by the Crowley-Milner Co., Detroit, in place of sheet writer's delivery slip. No. 4 at the top indicates the route number and the names in the four vertical columns, streets. Numeral under street names indicate street numbers. P indicates package and B, bundle. 2—Store's record of call order, used by the J. L. Hudson Co., Detroit. 3—Driver's call tag and customer's receipt used by the same store. 4—Distinctive tag for C. O. D. packages. 5—Garage time ticket used by Gimbel Bros., New York City

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# Truck Efficiency Largely Determined By Speed of Shipping Room Work

## Differences of Methods and Comparisons of Results in Leading Dry Goods Houses Show Trends of Development

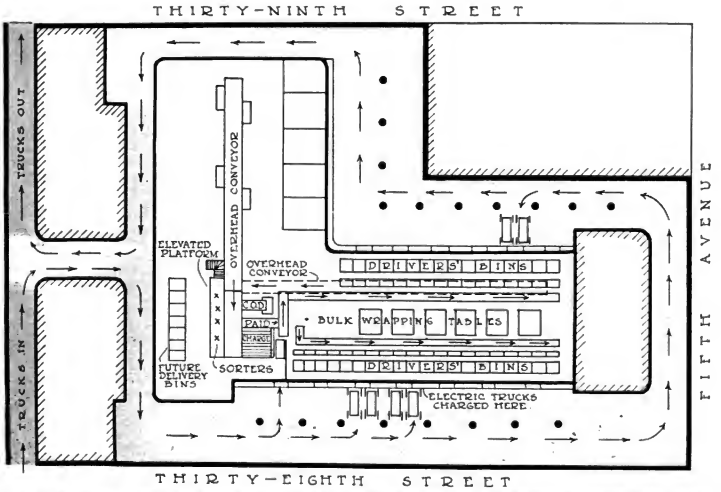
LOADING DELAY originates in the shipping room. Department store managers have learned how destructive idle time is to motor truck efficiency, and faced with the paramount necessity of making rapid, accurate deliveries, they have turned to their internal systems for relief. Within the past few years shipping room sorting methods have undergone great changes, not only in the ability to sort and route parcels rapidly and correctly, thus permitting drivers to get their loads on schedule, load them at once and be off upon their routes, but also in reducing the confusion within, in decreasing the working force necessary to handle a given number of packages, in eliminating much of the breakages that went with the pristine confusion and in making less floor space do more work.

Formerly rough wooden boxes or stalls served to receive the packages destined for different drivers. Cash girls in the different departments were often used to carry goods to be delivered to wrapping desks located close to elevators. Roller boxes were filled with the packages from different departments and lowered to the shipping room as filled.

### The Obsolete Method

Here the packages were dumped into an indiscriminate pile to be sorted, routed and entered on the drivers' sheets by a crew of jacks-of-all-trades who were truly masters of none in most cases. Often even these were done away with and the drivers themselves were required to make up their loads. At all events the horse hitched to the wagon contentedly explored his nosebag and waited for the good pleasure of his masters.

With the motor truck, every minute lost means so many fewer blocks run that day, so that several hours of needless delay meant such severe crippling of its ability to cover ground that delivery superintendents came to one or the other of two conclusions, namely, that the trucks were no good because they cost more to do the same work; or that




Sketch of Lord & Taylor shipping room and loading runways in basement of their New York store—perhaps the most highly developed package handling scheme in existence

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Part of the Marshall Field fleet of Packards, including 3-ton transfer trucks and 1,500-pound package vehicles on rebuilt passenger car chassis

they were suffering from serious shipping room congestion.

The latter diagnosis has proven correct, but is not always an easy one to prescribe for. Most of the big stores were built without consideration for the needs of motor trucks either on the part of the heads of the firm or the architect responsible. In many cases the most was made of facilities as they were, and in others great improvements were incorporated in new structures.

Modern shipping room processes divide themselves into three classes, namely, sorting, checking and routing.

### Classes of Packages

Sorting takes place upon the arrival of a package from the departments above, ready for delivery. Packages are of six different classes, as follows:

1—Paid. These have been paid for by the purchaser and are ready for routing.

2—Charge. These have been charged to the customer's account, but may not be delivered until he has been looked up to determine whether his credit is still good. If so, the package may be routed, but if not, it must be turned over to the C. O. D. desk and finally delivered collect.

3—C. O. D. These have been purchased by customers who for some reason cannot pay for the goods at the time of purchase, but who can pay for it when delivered. Such packages must be kept track of and a record kept of the amounts to be collected so that the driver is charged with the amount until he turns in the cash. Distinctive stickers must be attached so that on the drivers' sheets the packages will not be improperly entered, and so that the drivers will know that they are to make a collection for them.

4—Till, transfer or shopping card packages. These are individual parts of one purchase made in two or more different departments, which are to be delivered together, or which the customer desires wrapped into one bundle to be carried home by him. The buyer's shopping card is a book having a number of coupons in it. One of these coupons is pasted on each parcel. Each coupon bears the same number as the book itself. Each parcel as it reaches the till room is placed in a bin numbered to correspond with the number on the coupon. When the customer has made all of his purchases he turns in his book. When the book reaches the till room the packages are assembled and either placed aside for the customer to call for or sent out for routing for delivery.

5—Express, freight and parcel post. These packages are for delivery to points outside the delivery territory of the store and must be handled separately.

6—Re-wrap. These are packages which have been improperly wrapped in the department from which they originated and must be re-wrapped before proceeding with delivery.

Sorting is the first operation performed when a package reaches the shipping room. Various methods are employed in getting the parcels to the shipping room, the best method, as used by the newer stores being by means of spiral gravity chutes leading from all floors to the basement, the packages being moved from their outlets to the sorting pit by belt conveyors running along the ceiling of the shipping room, all of which terminate at one point. At this point there is usually a chute or inclined table.

A sorter, or sometimes more than one sorter, throws the packages as they come down onto other belts or chutes leading to the different sections of the shipping room.

### Where the Parcels Go

Paid packages are put on a chute or belt leading to the routing section. C. O. D. packages go to the C. O. D. clerk. Charged packages go to the credit-checkers. Packages with faulty wrappings go to the re-wrap table. Till or transfer packages go to the till room.

When the C. O. D. clerk has properly entered the charge for a package, it is thrown onto a belt or down a chute leading to the routing section.

The credit checkers note the name of the customer written on the sales ticket pasted to the package and refer to a card index to find whether his credit is good or not good, passing the parcel on either to the routing section or to the C. O. D. clerk, according to whether the customer's credit card is marked O. K. or N. G.

The re-wrapper wraps the package over again and turns it over to the routing section, the credit checkers or one of the other sections, according to the class to which it belongs.

Till packages are sorted into their bins according to number, and then when the transfer purchase is complete the parcels are wrapped into one bundle and sent to the routing section, the C. O. D. desk or the credit-checking section.

Express, parcel post and freight packages are sometimes sent to their respective sections directly from the sorter's pit or by the routers in the routing section, usually the latter.

### The Dispatcher

Preferred practice in routing is to have all packages come down a wide inclined plane, so arranged that the packages will be spread more or less evenly across it. At the foot of this inclined plane dispatchers to the number of from one to half a dozen stand. These men are experts on city geography, and by glancing at the address are able to tell on what route a package should be delivered. With a piece of crayon the dispatcher marks the number of the route on the package and deposits it on a moving belt.

This belt runs down an aisle between two rows of open bins. On one side of the belt, these bins are separated from the belt by an aisle. In this aisle are a number of routers, boys whose duty is to pick the packages off the belt and put them into the numbered bins according to the route numbers marked on the packages by the dispatchers. There is one of these bins, called sorting bins, for each route number, and one driver for each route.

Outside of the sorting bins are two more aisles flanked by rows of drivers' bins. The drivers' bins are usually of

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Out on the Pacific Coast. Four of Hamburger's Autocars, used in delivering to buyers in Los Angeles and vicinity. Their bodies are especially interesting

wire mesh completely closed with locked doors opening onto drivers' aisles on the outside.

Sheet writers are stationed in the aisles between the sorting bins and the drivers' bins. There is one drivers' bin for each sorting bin. The sheet writers enter the packages on drivers' sheets, placing each package in the driver's bin as it is entered. In each driver's bin there is usually a roller box or hamper which is used to convey the complete load to his vehicle at the time of loading.

The science of efficiency has progressed far in the operations of the modern department store shipping room, but all stores have not developed their systems along the same lines.

### The Rosenbaum System

One of the newest departures in shipping room methods was adopted by the new Rosenbaum store in Pittsburgh, as reported in THE COMMERCIAL VEHICLE of September 1, 1914. Requiring as much space as possible for sales in the basement of the store, with ground rent high as it is, the greater portion of the basement is used for sales and only a small corner reserved for shipping. In this space the sorting as to class, the credit checking, C. O. D. entry, re-wrapping, and transfer operations are performed, after which the packages are put into hampers. Two electric trucks carry these hampers to the garage and warehouse on a side street, where the routing section is located.

This arrangement permits the trucks to be loaded in their places on the garage floor. It permits the shipping room to be located on the third floor of the garage, where there is plenty of light and air and where there is plenty of room for efficient arrangement of the equipment.

Lord & Taylor, on the other hand, not only have the shipping room complete in the sub-basement of the store, but load the trucks there as well. The entire basement is available as sales space and nearly the whole sub-basement for the shipping room. Two ramps or inclined runways on a blind wall at the west end of the building connect the sub-basement with the street, one opening into Thirty-ninth street and the other into Thirty-eighth street. The Thirty-eighth street ramp is used only for incoming vehicles and the Thirty-ninth street ramp for outgoing ones.

### The Lord & Taylor Method

In the sub-basement there is a driveway entirely around the shipping room, making it in reality a large T-shaped island platform, with the stem of the T parallel with Thirty-eighth and Thirty-ninth streets. Both ends of this platform are used for other than delivery room work, so that the shipping room proper occupies the central portion Drivers' bins and sorting bins are laid out in two long rows one along each of the long sides of the platform. The drivers' bins are located approximately 3 feet from the edge of the platform on either side, so that no hampers are required to take the goods from the bins to the trucks.

The latter run up to the edge of the platform front first, a small step being provided in the platform step which strikes the vehicle wheels and prevents the truck fenders or hood from being damaged by not stopping the conveyance in time. The goods are sorted by the driver on the shelf in the bin or on the platform directly in front of it and then passed by him to the helper, who deposits them in the truck from the driver's seat.

### Charged While Loading

All of the deliveries made direct from the store are carried on electric trucks. After their day's work, each of the vehicles is run up to the loading platform and charged in this position during the night, charging receptacles being provided just above the step in the platform for this purpose. Boosts may also be given the batteries while loading.

The goods reach the shipping room on two conveyors suspended from the ceiling. The main one of these is located at one end of the platform and the other at right angles to it, or parallel with the long side of the platform. The latter is a separate conveyor, but the goods carried thereon are deposited on the main conveyor at about its midpoint and before any sorting operations are begun.

The goods are deposited on the two conveyors from a wrapping room on the floor directly above through eight chutes, four on each conveyor. The goods reach the wrapping room from the upper floors of the building through several spiral gravity chutes.

The main conveyor drops several feet nearer the floor shortly beyond the point where the other conveyor meets it. An elevated platform is provided along this low portion of the conveyor. Several sorters stand on this platform and segregate the goods according to class.

### Little Things Save Seconds

Seconds may be saved in shipping room operations by little things that usually escape scrutiny. One direction in which much time in the aggregate may be saved is in the original sorting of packages. It is customary with some stores to use pink sales tickets on C. O. D. packages and white ones on paid packages. This avoids confusion and error. If charged packages were affixed with yellow tickets and transfer stickers made more conspicuous a whole page instead of merely a coupon from the book the work of the sorter would be still further simplified.

If it is desired to avoid complicating the work of the salesperson who makes out the ticket, different colors of wrapping paper may be used so that one form is employed by the salespersons for all classes of goods, the wrapper making the distinction by wrapping different classes of goods in different colored papers.

Delay at the re-wrap desk is not always serious, but in some cases it constitutes a nuisance. This may largely be eliminated by following the example of Marshall Field & Co., Wanamaker's and other large stores in employing paste-

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board boxes instead of paper. These boxes are more expensive, but they are less likely to become wedged in chutes, on belts, etc., they are more easily handled by the sorters, dispatchers and routers, they may be packed in the body more conveniently and are easier to find than shapeless paper parcels and create a better impression on the customer.

### Credit Checking Takes Time

Credit checking has little to do with delivery, but if it consumes too much time it delays delivery. Recent improvements in card-indexing systems have made it possible to check the credit of a customer in less time than with the old style of card index.

The new forms are made like huge books, the leaves of which are metal frames hinged to the wall and being adapted to receive the cards in two or more columns. In some stores difficulty is found in changing cards or inserting new ones, every card behind a new one having to be moved back one space. The latter form should be avoided as it entails much work and makes it practically impossible to insert new cards or remove old ones during the day.

In any shipping room a paid package should be given every preference and the series of operations so planned that a paid package will not be obstructed at any point by those of other classes.

Transfer packages are sometimes allowed to obstruct the smooth flowing of the delivery department, when in reality they should not intrude upon the shipping room operations until assembled, since the assembling of goods purchased on a shopping card is no part of delivery.

Many stores complain that their customers cannot be induced to make use of this convenience, purchasing articles in a dozen different departments independently, so that to make the delivery to this one customer it is necessary to do as much work as is required to sort and route a dozen deliveries. Other stores do not conduct transfer departments.

To be an unmitigated blessing and an attractive convenience to the customer as well, it is necessary that the transfer department work swiftly, so that when a customer calls for his goods, if he is taking them home, he will not be subjected to vexatious delay. It must under no conditions hinder the shipping room help in the handling of other packages, and the transfer desk must be located conveniently to all main exit doors. Customers cannot be blamed if they refuse to go to a remote section of the basement to the transfer desk. All salespersons should be supplied with transfer books, if this is possible, so that it will be made as easy for the customer to shop on a transfer as possible.

### Sheet Writing—a Necessity?

Sheet writing has been considered an expensive necessity, and is one of the greatest delays encountered by a package in the shipping room. Its necessity consists of the need for some means of checking up the drivers to prevent loss or theft by them, while at the same time protecting the driver from being unfairly charged with the undelivered packages which he has not received.

Usually the drivers' sheets are written in triplicate, the original copy going to the driver, and the carbon copies to the main office and to the credit department. C. O. D. packages are often entered upon different sheets, so that the driver will have no cause for confusion and so that a separate check may be had, but this is not always the case, Lit Bros., in Philadelphia, having C. O. D. packages, calls and straight deliveries entered upon the same driver's sheet.

When the driver is ready for his load he receives one copy of his route sheet. In loading the packages into the vehicle he and his helper check over all packages as loaded and sign the sheet as a receipt for them. Upon returning at night the driver must turn in all calls, pay over all his collections and return all packages which he has been unable to deliver.

A special clerk in the return department in big stores, attends to the checking of returned goods and sees that it is put back into stock and the stock records corrected.

The C. O. D. cashier must see that the driver has turned in all collections or else returned the C. O. D. packages before leaving the store.

### The Customer's Signature

In a few stores the driver is required to get the signature of the customer on delivery of all packages, this signature being written in the space opposite the name and address of the customer on the driver's sheet, but this is no longer general by any means. Nowadays, in most stores, whether or not a package shall be signed for is left up to the driver, who is responsible for the delivery of all packages.

If the package is valuable, it is so marked by the sheet writer and the driver usually requires the customer's signature. In case of complaint, a duplicate of the driver's sheet is consulted by the complaint department. If the records of the delivery department show that the driver signed for this package, along with the others on that sheet and that it was not returned, he is required to produce the package with an explanation or else stand good for its loss.

### The End of Sheet-writing

Halle Bros. and the May Co. stores in Cleveland have tried out and adopted a system whereby sheet-writing is dispensed with, together with the extra clerical labor and delay which it entails. Under the system the original sales ticket is made out in triplicate instead of duplicate. The sales ticket is one sheet of paper divided into three parts by perforations. The original portion is pasted on the bundle after it has been wrapped at the desk at the point of purchase. The two carbon copies are tied to the package and stay on it until it reaches the shipping room. There they are torn apart along the perforation, one portion going to the office of the delivery superintendent and the other remaining on the package. This operation can be done either at the point at which the packages are sorted as to class or at the driver's bin when the latter receives his goods preparatory to loading them onto his truck.

In either case, one of the slips is kept in the shipping department and the other given to the driver in place of the con-

One of the Marshall Field transfer trucks, loaded with the trunks which carry the drivers' loads to the sub-stations

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Shipping room of the Broadway department store, Los Angeles, Cal. The trucks are shown being loaded from the drivers' bins, with drivers and helpers checking over loads. Like the Lord & Taylor system, the Broadway trucks are loaded in the sub-basement, elevators being used instead of ramps

ventional sheet writer's slip to enable him to load the packages as required for delivery. That portion of the record kept in the shipping room indicates that the package was received there and also that the driver took with him the package bearing the original part of the record. This makes each driver responsible for all the packages, the duplicate slips of which are in the possession of the shipping room superintendent.

Both C. O. D. and paid packages are handled in the same manner, the driver settling up for his collections each trip by checking the amount against the total as obtained from these portions of the triplicate forms kept in the shipping department.

### When the Wind Blows

The driver routes his goods from the slips, arranging these in order with the manner in which he is to deliver the packages. To prevent the slips becoming lost due to blowing away in windy weather when the driver has several hundred of them, they are placed in a small stiff-covered book binder of the loose-leaf type. As each package is delivered the slip is turned up against the front cover of the binder and held in place by an elastic band around them and the cover. This prevents the slips from falling out of the book or blowing away and also keeps all of the slips of the packages delivered in one group. The slip on the top of the remaining bunch shows what package is to be delivered next.

A convenience in calls for returned goods is to be found in use by Kaufmann & Baer, Pittsburgh. Besides being entered on the driver's sheet, the calls are made out on tags, provided with perforated stubs. These are snapped together with a rubber band and handed to the driver with his C. O. D. sheet, a special holder being provided on the vehicle. When a call is to be made, the helper is handed the tag or tags for it. Upon receiving the goods from the customer, the tag is tied to the bundle and the customer given the stub as a receipt. On returning to the store the driver merely hands over the tagged goods without explanation, the tags telling the full story.

### Novel Route Sheet

In some stores, for example that of the Crowley-Milner Co. in Detroit, the driver is not given a copy of his route sheet, for as entered by the sheet writer, the packages are usually very much out of the logical order of delivery. Instead, this store gives its drivers a large route card with the route number marked on it and the names of the streets printed in four vertical columns, spaced very wide. This sheet is shown at No. 1 in the illustration at the top of page 14, somewhat shortened, of course, to accommodate it to the page.

As the packages are sorted over by the driver and helper and loaded into the body with the first delivery in front, the driver marks the addresses in the spaces below the street names together with the number of packages, and whether they are C. O. D. or calls. Thus "298 2 P 1 Call," written under the word Beaufait would mean that at 298 Beaufait street the driver was to deliver two packages and call for one to be returned. B represents a bundle or box. The streets are arranged according to the order in which they occur on the run, so that the driver needs do no routing himself, the route sheet even guiding him as to what part of the body a package should occupy as loaded by the helper.

### Takes No Longer

With the simple code employed it takes little if any longer for the driver to make out this convenient form than it does in other stores for him to check up the sheet-writer's list. It would seem, therefore, that the ultimate development of the dry goods shipping room system would be a combination of the Crowley-Milner and Halle schemes, the sorting bins being eliminated from the shipping room and the sorters throwing the packages direct from the belt into the driver's bin, retaining a stub from the ticket in a small box in lieu of the route sheet.

When the driver called for his goods he would be required to make out his own route sheet as he sorted the load, counting the packages as he did so. Meanwhile the sorter, or a special clerk for this purpose could be counting the stubs of the sales tickets and making out a receipt for that number of packages. The driver's signature on such a receipt would give identical protection to that afforded by the conventional sheet.

### Making Drivers Responsible

A good method of fixing responsibility upon the drvier is employed by Lit Bros. in Philadelphia. Every driver's sheet has a folded stub upon which are printed the house rules as applying to drivers and helpers. A fresh copy of the rules, therefore, is given the driver every time he makes a trip, so that none can plead ignorance of them as an excuse for their infraction.

Much confusion is also saved by Lit Bros. by barring the drivers from the shipping room. Owing to a rather cramped space for the shipping room and very poor facilities for getting the packages to the street for loading, two men are given the sole duty of getting up the drivers' loads and getting them into the street instead of allowing a horde of hurried helpers and drivers to swarm into the shipping room in the morning. These men prepare the morning loads at night, so that in the morning every package to be delivered is in a roller box marked for a certain route number. The drivers receive their packages from a sidewalk lift all ready for loading.

Many of the older stores in the large cities find it necessary to have sub-stations from which the goods are relayed, the actual delivery vehicles starting and returning from these instead of from the main store. Whether or not it is wise to employ these in connection with motor equipment is a mooted question, but it is significant to note that many of the largest eastern stores have abandoned the practice.

Lord & Taylor have eliminated all sub-stations except those in distant sub-

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urbs, such as Mount Vernon and Far Rockaway, which are not in New York City. Practically all of the Pittsburgh stores have abandoned sub-stations. Halle Bros. in Cleveland never used them. J. L. Hudson in Detroit has never used them. The Jordan-Marsh Co. in Boston delivers everything direct. Lit Bros. in Philadelphia recently abandoned an elaborate sub-station scheme and now delivers everything direct. Filene's in Boston, Hanghton & Dutton in the same city, in fact, no store in Boston, in spite of its great suburban population and territory, employs sub-stations.

In smaller centers, such as Louisville, Cincinnati, Hartford, Conn., Kansas City, Mo., and Los Angeles, Cal., sub-stations are unknown.

Sub-stations are a horse heritage. They are monuments to slow vehicles and congested streets. This opinion is reached in spite of the fact that Marshall Field & Co., Mandel Bros., Carson Pirie Scott & Co., Rothschild & Co., Siegel-Cooper & Co. and in fact nearly all of the big Chicago stores deliver the greater part of their packages through sub-stations, that Wanamaker's and Gimbel's in both New York and Philadelphia use sub-stations; and that elsewhere in the older stores the practice is prevalent.

When horses alone are relied upon deliveries at a distance are impracticable direct from the store. A horse cannot make a run of 100 or more miles in a day, and so the packages are relayed. Formerly in Chicago 3- and 5-ton drays were used to haul all packages for a given neighborhood to the sub-station for that neighborhood. Here the packages were routed and distributed among a number of small delivery wagons, which made the final delivery.

### The Horse-pace Method

By this scheme no vehicle was required to run much over 18 or 20 miles a day, some even less than this. When the Chicago stores installed motor delivery they merely applied commercial vehicles instead of horse wagons and continued the old system. The individual routes were made longer and more frequent trips made, but to all intents and purposes the trucks were run at horse pace.

Some of the Chicago stores merely route the packages as to direction at the store, putting all packages for the south side in one bin, those for the north side in another, those for the northwest side in another and for the southwest side in still another, the actual routing being done at the sub-stations.

Marshall Field's, however, also Wanamaker's in New York and Philadelphia, sort all packages according to driver at the store, those to be relayed through the sub-stations going into trunks instead of bins, each trunk being marked with the number of the route which it serves. These trunks are locked and transferred to the sub-stations in 3-ton trucks. The drivers load direct from the trunks to their vehicles without delay. The latter system is far preferable.

Sub-stations may be eliminated in practically all stores except possibly those doing a business beyond a 30-mile radius, such as Lord & Taylor's. Obviously it would be out of the question to run a truck daily between South Norwalk, Conn., and Thirty-ninth street and Fifth avenue, New York, the mileage between the two points alone, and not including that in actual deliveries being 100 miles. To Asbury Park and back would be nearly 150 miles.

Kaufmann & Baer in Pittsburgh, nevertheless, find it profitable to deliver to certain points nearly 50 miles distant from the store by a 1,500-pound truck which leaves the shipping platform every morning at about 9:00 a. m. and returns usually before 5:00 p. m. In a run of 103½ miles, this truck, when the store was not yet a year old, delivered 45 packages, taking 7 hours and 48 minutes for the entire trip, of which a shade under 4 hours was spent in the trip out and back. This was made possible by an average running speed of 17¼ miles per hour.

### Stores Lack Loading Space

The chief reason for the retention of sub-stations within 30-mile radii by some of the large stores is that loading space for the total number of delivery vehicles has not been provided. In some cases this is because the buildings were built before improved motor delivery was thought of.

Marshall Field & Co. load their trucks in an alley between buildings. Wanamaker's in Philadelphia loads all its trucks on the public street in Penn Square. By installing the Rosenbaum system or the Lord & Taylor system, these stores could easily accommodate all their vehicles at the main store, with a possible exception of those of the very longest hauls.

# How Bulky Goods Is Sorted

## Heavy, Fragile and Unwieldy Articles Are a Problem

## Antique Packing Methods Engender Delay at Both Ends and Cost More

BULKY GOODS constitute a problem different and perhaps more perplexing than that of dry goods and if those of the latter seem hard to solve, the ideal delivery system for bulky goods must be exceedingly difficult of conception, yet progress has been made, since motors were introduced, which point the way toward still further improvement.

The great difficulty with bulky goods, with which must be classed breakables, is that it cannot be sorted and routed like dry goods. It cannot be shot down to the lower floors in chutes nor thrown from belt to bin by nimble-fingered sorters. Imagine a washing machine, a baby carriage or a mission lamp tumbling down a spiral conveyor! Fancy a roll of linoleum being tossed lightly from the dispatchers' table to the routing belt!

Such goods must be taken down in elevators. If fragile it must be carefully packed to avoid breakage in transit and if unwieldy it must have plenty of room.

Just as in a foundry the highest efficiency is attained in bench moulding and with multiple patterns, while the moulding of large castings must nevertheless be done singly and on the floor; so delivering heavy, large or fragile goods must be a more difficult and crudder process than delivering dress goods, garments and notions.

Wanamaker's in Philadelphia has worked out a method of shipping this class of goods which closely approximates the dry goods package scheme. Of course, there are no gravity chutes, no belt conveyors and no orderly rows of bins, but much of the confusion and disorderly appearance common to packing rooms is absent.

The goods arrives either on its own wheels, standing alone or in roller boxes, on special elevators which have no other work to do. It is sorted as to class, just as is the case with the smaller parcels and then routed in practically an identical manner.

The difference is that instead of the packages themselves passing from hand to hand, only the tickets do. Meanwhile the goods is packed or tied up ready for delivery. Dispatchers mark the route numbers on the goods. Sheet writers with no other duty enter the deliveries on regulation drivers' sheets and the packers place them in drivers' bins when ready.

### Like Parcel System

The room is a square one with separate benches for different forms of packing and an open space on the floor for

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the crating of larger articles. No furniture is handled, for, as is the usual custom in modern department stores, furniture is sold by sample and delivered direct from the warehouse in special vehicles. About three walls are open bins or stalls, similar to those in horse stables, one for each driver who handles fragile goods.

A sidewalk lift is used for the fragile goods, separate entirely from the escalator used for dry goods. Large handtrucks are used to take the assembled loads to the truck tailboards.

One of the keys to the efficiency of the Wanamaker fragile shipping room is in the manner of packing. Formerly the method of packing, say a dozen goblets, was to take a barrel and a bale of hay and pay an expert packer a good wage to concoct a packing which was a nuisance alike to the men who had to handle it and the poor flat-dweller who had to unpack it and dispose of the litter.

The Wanamaker way is to employ special fibre boxes, similar somewhat to egg boxes used by grocers. These boxes are made in all sizes to accommodate all sorts of breakables, and are lined either with easily-renewed corrugated strawboard partitions or felt pads according to the class of goods.

**For the Fastidious**

Wedding presents, valuable cut glass, etc., are wrapped specially, merely for the looks and impression created, in pasteboard boxes with tissue pads stuffed with shredded pink and white paper. Fortunately such packing is confined to the fastidious and assumes no great proportions.

The fibre used is similar to that employed in the construction of theatrical trunks. It is as stiff as wood, wears like iron, is water and oil proof, does not warp or crack and can be worked like tin. The boxes are somewhat expensive, but as they are used over and over again, they are infinitely more economical than any other form of packing. The boxes have close-fitting lids of the same material and fabric straps with pinch buckles. At the middle of this page a goblet box, lined with corrugated strawboard and a felt-lined thermos bottle box are shown.

Thermos bottles are exceedingly fragile and once broken are practically useless.

The advantages of these boxes are as follows:

1—They save time. A set of cups and saucers, a dozen tumblers, or in fact anything of the sort may be packed in a fraction of the time necessary by the old method.

2—They are cheaper. Not only is the expense of hay, straw and excelsior saved and the cost of barrels and baskets, but a smaller number of less-skilled packers may be employed with less likelihood of improper packing.

3—Less breakage. The boxes will stand any amount of rough handling, and the resilient lining amply protects the contents. As an example, it used to be common for packers to wrap graniteware so that the inside and top was heavily covered with excelsior but the rims and handles were exposed to damage. Chipped graniteware is not acceptable to experienced housewives who have paid for perfect goods, nor salable over the counter.

4—A great deal of space is saved, both of the expensive floor-space of the subbasement and the room in the truck bodies.

5—Cleaner and more convenient to customers. There is no litter to clean up in unpacking and none to dispose of.

6—More convenient and safer in returns. Drivers may safely be sent out to bring in china and glassware, even Thermos bottles, where formerly this was out of the question, as customers will not or cannot wrap such goods properly, nor can the driver. With the fibre boxes, a few of which the driver carries at all times and which he may be supplied with, of just the right size, when making calls, the driver may return anything without breakage.

**Types of boxes used by Wanamaker's to pack fragile articles, showing goblets and Thermos bottle with their respective types of fibre boxes, lined, respectively, with corrugated strawboard and felt pads**

For some reason Wanamaker officials have hesitated to install this equipment at the New York house, deeming it unadapted to New York conditions. The reason is that the majority of New York apartments are of the elevator type, all deliveries being made by dumb waiter. Inasmuch as the deliveryman must return the box, it is thought impracticable to have him wait for the customer to open the box and remove the contents and then return the box.

Consideration of Advantage 5, however, would seem to indicate that dwellers in such apartments would be the ones most benefited by such packing means. Ice cream dealers have no hesitancy about sending up freezers to customers, and allowing them to keep them until the next time the deliveryman calls.

## International Motor Earns $1,000,000 in 1915

NEW YORK CITY, September 29—For the calendar year 1915 it is predicted that the net profit of the International Motor Co., New York City, builder of Mack and Saurer trucks, will be $1,000,000 in round numbers, or about 28 per cent of the $3,600,000 outstanding preferred stock.

The improved business did not start until after last March, business being very poor prior to that time. Since then, however, orders from the Allies have rushed the plant to such an extent, together with increased domestic trade, that some of the departments have been working day and night.

The greatest profits for any one month were $125,000 equal to a million and a half per annum or about 42 per cent on the preferred.

## Dual Tires Now Overrated

It is the opinion of the B. F. Goodrich Co., Akron, O., that dual tires cannot possibly have a greater carrying capacity than twice that of a single tire of which it is composed.

"The schedule of ratings now in use, which is subject to exception and criticism, rates duals higher than the equivalent singles. This will undoubtedly be changed in the near future," states this manufacturer.

"We are urging the selection of tires to those users of motor trucks who care to heed our suggestion, on the basis of adequate singles in place of inadequate duals.

"Our only object in this recommendation is to better the mileage obtained from solid tires and to assist truck operators to obtain as much mileage in excess of their guarantees as is humanly possible."

## NEW BOOKS

**"Repairshop Short-Cuts"** has just been issued by The Motor World Publishing Co. for the information of all users, repairers and dealers in motor vehicles. It consists of 161 repairshop kinks which have so far been published in Motor World. These hints have been secured by the Motor World Road Man, from repairshops all over the country. They are all practical labor-saving schemes for performing work in an easy way and without expensive equipment, where the job is an exceptional one and does not warrant its purchase. All but the simplest of these are illustrated by pen-and-ink sketches taken from life and the descriptions and explanations are couched in simple, direct language which present the idea clearly and quickly.

The book contains 48 pages without advertising and is bound in a light blue paper cover. It may be bought for 50 cents from The Motor World Publishing Co., 239 west Thirty-ninth street, New York City.

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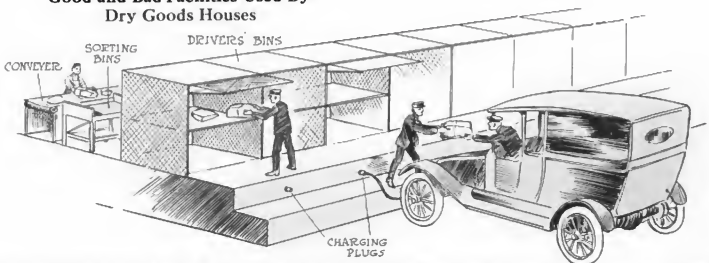
# Loading Methods Retard Delivery Trucks

## Good and Bad Facilities Used By Dry Goods Houses




How Lord & Taylor trucks are loaded in the sub-basement of the palatial New York establishment, showing section of shipping room and truck runway

OF GREATEST IMPORTANCE to the successful operation of motor trucks in the department store trade are the methods employed in their loading. While the use of modern mechanical internal systems for package handling have aided somewhat in increasing the efficiency of trucks operated from buildings with very poor loading facilities, these systems fall far short of their possibilities just as long as the poor loading facilities remain unremedied.

It is impossible to operate motor trucks successfully on horse-pace methods. One of the most flagrant of the horse-pace abuses to which many department store fleets of trucks are subjected is to load them in the same manner as the horse wagons which they replaced were loaded. While an idle loading time of 1 or 2 hours a day did not materially diminish the work done by a horse during the day, and in some cases was necessary in order to give the beast a rest, the same percentage of idle time in the operation of a motor vehicle plays an important part in the latter's cost of operation per unit of work done because of the truck's greater cost of maintenance and its unrealized ground-covering possibilities.

### Loading Delays Expensive

Thousands of dollars are today being charged against fleets of department store trucks all over the country simply because their owners deem it more expedient to operate them with poor or no loading facilities than to change the construction of certain portions of their buildings in such a manner that the vehicles can be loaded without unnecessary delays. This condition of affairs is decidedly unfair to the motor vehicle. One might just as well endeavor to run a modern steam locomotive with a tencar train over a construction-job track of uneven ties and no ballast, as to operate a motor truck with horse-pace loading. In either case you not get results commensurate with the cost.

That this condition of affairs unfortunately exists in the department store trade is due to three main causes, as follows: 1—To the fact that the great majority of department stores were built before motor trucks were considered as delivery vehicles and therefore have no provisions for efficient truck loading. 2—To the fact that many of the building architects have no clear conception of motor truck needs.

3—That many of the present-day department store heads cannot realize that the cost of providing modern truck loading facilities will be paid for in a few years' time by the savings effected on the trucks themselves.

The old-fashioned method of designing a department store seems to have been to build that portion of the building desired for sales space first and to relegate the shipping room with its loading facilities to the least-desired corner. Fortunately this idea seems to be slowly vanishing after many years, as is exemplified in the new Lord & Taylor department store in New York City, which, you might say, was built around its shipping room and delivery department. In this case the shipping room and proper loading facilities for the motor vehicles were decided upon first and the sales floors added later.

### Shipping Room Location

Closely identified with the proper loading facilities for motor vehicles is the location of the shipping room. In most cases this is placed in the basement or sub-basement, as these are the two floors which are the least desirable because of the artificial light necessary and not over-abundant supply of fresh air which it is possible to force into floors below the street level.

When the shipping room is located in

Loading one of the Halle Bros. Whites on the quiet back street which it abuts. Customers use the Euclid avenue entrance. Note steel and glass canopy for protection against bad weather

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the basement or sub-basement, either elevators, sidewalk lifts or escalators are used to bring the goods to the street level. Roller boxes, made of wood, fiber or rattan are most commonly used to carry the packages from the shipping room to the tailboards of the vehicles.

**Basement Shipping Rooms**

Among the department store concerns which have their shipping rooms in the basement or sub-basement and use either elevators inside the building, or sidewalk lifts outside of it, are John Wanamaker, Lit Bros., and Gimbel Bros., in Philadelphia; Marshall Field, in Chicago; Halle Bros. and the May company, in Cleveland; Jordan-Marsh, in Boston, and the Rosenbaum company in Pittsburgh.

The Gimbel store in Philadelphia utilizes its regular receiving platform for shipping purposes during the peak-load periods because at those times there is very little goods being received, while the ordinary shipping platform is congested because of the extra volume of goods which must be handled.

The Rosenbaum company does not sort its deliveries except as to class in the basement of the store, the routing and the loading of the trucks being done in a separate building several blocks away, as reported in THE COMMERCIAL VEHICLE of September 1, 1915. This method of loeating the shipping room in a separate building at some distanee from the main store gives the Rosenbaum company much more room for its shipping than could be afforded at the store itself and eliminates the idle runs by all the vehicles from the garage to the store.

**Escalators' Advantages**

The Wanamaker store in Philadelphia and the Kaufmann & Baer store in Pittsburgh both use escalators to carry the roller boxes from the sub-basement to the sidewalk. While the escalators take up more room than elevators, they have many advantages over the latter, the most important of which are the saving of time and labor.

Loading furniture at one of the Rothschild warehouses in Chicago. This is the usual method, the furniture being sold by sample in the store and repticas of the samples delivered direct from the warehouses. The roadway is an asphalt alley beneath the South Side elevated

Time is saved because there are no delays, as with elevators, of waiting for them to come down to take a loaded roller box up or to come up to take an empty one down. Labor is saved because it is not necessary for a man to accompany each roller box from the shipping room to the sidewalk and back again, as is the case when elevators are used.

One man stationed at the top and another at the bottom of the up-going escalator are the only ones required to handle all the roller boxes which can be pushed on the escalator, with the front of one touching the rear of the preceding one. The empty roller boxes are carried back to the shipping room by merely pushing them onto the top of the down-coming escalator, at the bottom of which they are taken off and pushed to their places in the drivers' delivery bins.

**Truck Loading Classified**

The location of the trueks while being loaded may be divided into seven different classes, as follows:

1—At a platform on the sidewalk.
2—At the street curb.
3—In an alley.
4—In a court.
5—In a special loading bay.
6—In the basement of the building which the trueks reach by means of ramps.
7—In a separate building.

Of these, the sidewalk loading of the trucks standing at the street curb is the most inefficient, and, unfortunately, the most common. The loading of the trucks in a building entirely separate from the main store and the loading of trucks in the basement of the main building by the use of inclined runways are two of the most efficient methods in use, each having its advantages over the other

The May Co., like Halle Bros., both of Cleveland, loads its trucks on a back street, where the vehicles are out of sight of the main shopping streets of the city and where there is less traffic congestion

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under certain conditions, as will be explained hereinafter The loading of the vehicles in a court or a special loading bay are efficient schemes, but such bays consume much valuable ground space. Loading in an alley is only slightly better than loading at a platform on the sidewalk, which in turn is little better than loading at the curb, which is the worst of all. Where a private alley of adequate size and well paved is used, however, as is the case with Marshall Field & Co., it is highly satisfatory.

Among those companies which load their vehicles at the curb by pushing the roller boxes across the sidewalk are John Wanamaker, Lit Bros. and Gimbel Bros. in Philadelphia; Gimbel Bros., in New York City; Halle Bros. and the May Co., in Cleveland; the Jordan-Marsh company, in Boston, and Kaufmann Bros., in Pittsburgh. Of these concerns, Gimbel Bros., in Philadelphia, and Jordan-Marsh, in Boston, also load some of their vehicles in narrow side alleys.

The great drawback to loading over the sidewalk is that it is very slow and holds up the motor vehicles for long periods, and for this reason is also very costly. Other disadvantages are the damage to goods in rainy or snowy weather, the congestion of the roller boxes on the sidewalk, which hinders and annoys pedestrians, hinders the work of the loaders and renders the danger from theft imminent.

How loading should not be done. Above, loading Lit Bros.' Autocars on Market street, Philadelphia —obstructing the sidewalk, occupying valuable street traffic room and delaying the trucks. Below, alley loading of the trucks of the Outlet Co. in Providence, the roller boxes being pushed through the snow to the tailboard of the truck

### Making the Best of It

The Lit Bros. company, which loads all of its vehicles on the Market street frontage of the store one of the busiest thoroughfares in the Quaker City, by means of roller boxes pushed from a sidewalk lift to the tailboards of the trucks, has made this admittedly-poor system somewhat better by employing two men whose duty it is to load all of the packages in roller boxes at night, thus saving the time of the drivers in the morning by making it unnecessary for them to go into the basement, get their own loads and push them to the sidewalk lift. It is said that the saving in breakage alone pays the salaries of these men, while the saving of the idle truck time is even greater still.

In the Kaufmann Bros.' store, the shipping room is located on the second floor and the packages are carried down to the first floor in roller boxes on elevators. From these they are pushed across the sidewalk and unloaded at the tailboard of the vehicle. This method is the same as that used in the stores mentioned above, except that the shipping room is located on the second floor instead of in the basement. If gravity chutes were used instead of roller boxes and elevators and the packages shot direct into the rear end of the truck bodies from the second floor, this system would be an ideal one.

All of the Pittsburgh department stores with the exception of Kaufmann & Baer's load their trucks at the curb. This is unnecessary as Pittsburgh is one of the few large cities of the east that has many alleys. The Kaufmann & Baer structure is provided with a generous loading bay at the rear, accessible from two alleys, at but little sacrifice of space, and at an enormous saving in time and labor. A portion of this loading bay is shown in the illustration at the top of page 25. In considering the wisdom of the provision of a bay of this kind, the moral effect upon the purchasers who are never obliged to dodge roller boxes going hither and thither, or to pick their way through mazes of boxes and packages scattered all over the sidewalk, cannot be overlooked.

### Which Is Best?

The relative merit of the use of a special loading floor in the basement of a department store which is entered by means of inclined runways as against the construction of an entirely separate building some distance away from the main store, depends upon the cost of each method, the cost of the construction and maintenance of the separate building as compared to the cost of the

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floor space in the main store, the cost of the transfer work in the former case which is unnecessary in the latter, and the relative time it takes for a package to be delivered under each method. These conditions are interdependent and while they must be considered separately, the final decision as to which method is best must be based upon the method as a unit.

Consider the case of the Rosenbaum company, which uses the separate building method, and the Lord & Taylor company, which has its loading platform in the sub-basement, which is entered by means of ramps.

The Rosenbaum company originally planned to have its building directly across the street from the main store, as reported in THE COMMERCIAL VEHICLE of September 1, 1915. This plan was frustrated because it could not obtain the perpetual rights for an underground tunnel to carry the packages between the main store and the separate building which was to be used as a shipping room and a garage combined. It therefore decided to use the third floor of its warehouse as a shipping department, the second floor as a warehouse and the first floor as a garage.

### Shipping Room Divided

The packages are sorted as to class in the main store basement, carried to the sidewalk in roller boxes on elevators, loaded onto transfer trucks and hauled to the first floor of the garage building. Here the roller boxes are again put on an elevator, carried to the third floor, unloaded onto a belt conveyor and routed in the conventional manner. From the drivers' bins on the same floor the packages are again carried down to the ground floor in other roller boxes by the drivers and loaded into the trucks at their positions on the garage floor.

The advantages of this system are that it costs less per square foot of floor area in the separate building in the uncongested part of the city than it does in the main store; that for this reason there need be no obstacle in laying out the delivery system in the most efficient manner; that all of the vehicles are loaded inside, and that the greater portion of the basement at the store is conserved for sales purposes.

### Lord & Taylor's Advantages

The disadvantages of this method are the need for transfer trucks; the need of a man in charge of that portion of the shipping room at the store and another at the garage; the need of clerical work in checking the goods from the store with those received at the garage, although this could be eliminated by the use of locked roller boxes; the great number of times which each package must be handled and the time which it takes a package to be delivered after it has reached the shipping room.

Good loading methods. Above, the loading bay in the alley back of the Kaufmann & Baer store in Pittsburgh. The bay is out of sight of the main street. It is directly above the sub-basement shipping room and the vehicles do not obstruct the alley traffic, nor are they obstructed by it. Below, escalators used to elevate the loaded roller boxes from Kaufmann & Baer's sub-basement to the loading platform on the alley bay. Note box coming down unattended

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# Body Features Which Increase Truck Efficiency

## Appearance and Utility May Be Combined in Ideal Delivery Car

A combination package and furniture body mounted on 1½-ton Autocar of the Bamberger company of Newark, N. J.

BODIES for dry goods trucks have an importance that should not be lost sight of. They are the containers for the stock in trade of the store as it reaches the greater part of the customers. The efficiency of a vehicle is largely determined by the amount of work that can be accomplished with it in a day. The design of the body has a great deal to do with the rapidity with which the truck crew is able to load the goods and make the deliveries.

There are three principal types of bodies in use for department store delivery. These are the delivery body, pure and simple; the furniture body and the transfer body.

Delivery bodies are of many types, but the standard type is a simple flush panel type, the fashion lately being for the simplest design possible. The latest developments in body design are typified in those used on the trucks of Lord & Taylor and the Eleto Co., in New York City. These, whether on the electric or gasoline vehicles, are all of the same type.

They consist of flush panel-sided affairs with high front doors, attractive rectangular windows and rounded rear corners. The rear of these bodies is an exact replica in design of the most expensive limousine, having the same type of high windows and being without rear doors. So striking is this similarity that one driving a car following a Lord & Taylor electric might go for blocks without recognizing it as other than a well-kept private equipage.

On some of the Eleto Co.'s gasoline delivery cars, mounted on high-powered six-cylinder Pierce-Arrows and Packards and on Whites, a rear door has been patched in, this being necessary because these vehicles make long suburban runs with all manner of merchandise, some of which must perforce protrude beyond the back of the body. All of the other vehicles, however, have neat closed rears. They all have deep fenders that well might grace a touring car, neat cowl dashes with flush lights, full-closed running boards and substantial windshields.

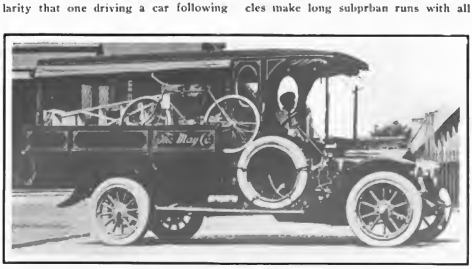
Novel holder for call-tags as used by Dey Bros., Syracuse, N. Y.

Such bodies not only carry out the atmosphere of distinction and exclusiveness which is affected by the Lord & Taylor establishment, but serve practical purposes. The absence of fancy moulding and panel work on the body makes cleaning easier and permits the coachwork to grow old much more gracefully than otherwise. The flush doors protect the driver from dust and mud which otherwise woud sully the immaculateness of his uniform as well as keeping him warm in cold weather. The closed rear renders theft of the contents of the body impossible.

Closed rear ends are being extensively adopted by dry goods stores. Stern Bros. have adopted a body designed by a member of the firm in which the only access to the load is through the front, this body being used on all its delivery vehicles, electric- and gasoline-powered.

Facilities for the accommodation of packages are of paramount importance in the design of delivery bodies. Too many purchasing agents concern themselves chiefly with the aesthetic features of body design to the exclusion of the more practical elements. Primarily the body should be so arranged that it may be loaded quickly and so that the packages may be removed by the deliverymen in the shortest possible time. The body should also be arranged so that the driver is out of the way of the helper while he is getting in and out of the truck, and so that the helper mounts and alights on the right, or curb side. The driver should always be to the left.

Most gasoline trucks are arranged so



A screen-sided delivery body with wide side wings for carrying bulky goods as used on the 1,500-pound Whites of the May Co., Cleveland

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Two Autocars with panel bodies in use in Philadelphia, one by John Wanamaker and the other by Gimbel Bros.

that the cabs are readily accessible, but electrics are frequently designed so that it is necessary for the helper to climb over the wheel, alike to his impediment and personal danger. Many minutes may be saved by an arrangement calculated to permit the helper to alight before the truck comes to rest and to board while it is going through the first speed, or in the first controller notch, in the case of the electric.

This is why Mandel Bros. have required a special design of electric in which the cab is located back of a dummy hood. It is why Lord & Taylor required a special chassis design of the General Vehicle Co. in filling its order for electric delivery cars.

Access to the load for loading is provided for by having the windshield so hinged to the roof of the cab that it may be drawn upward and inwards entirely out of the way and by having the driver's seat divided, the helper's half arranged to fold out of the way, leaving an aisle into the body.

Folding seat-backs permit front access to the load while on the route. The usual practice on the route is for the driver to select the packages from the load, as he reaches the various streets on which deliveries are to be made, and to have them ready for the helper when he returns from each stop. By this system, when the stops are close together, the helper need not board the vehicle, but can receive the packages on the ground, riding on the running board between stops more than a few doors apart, on the same street.

Where two helpers are used it is often possible for the driver to so arrange his route that he need not wait for a helper, but can load him up with packages for several stops and meet him on the other side of the block, meanwhile locating the second helper further on, to be picked up at a later point.

Obviously these methods are out of the question without ready access to the load, for the driver must not be required to leave his seat.

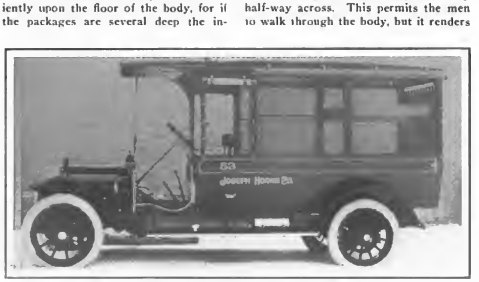
Such access is provided to a great extent by so loading the packages that the first deliveries are closest to the seat and the rest farther toward the rear in the order in which they are to be delivered. When the packages within the reach of the driver have been removed, a stick is sometimes used to pull the back ones forward. These sticks are often improvised by the drivers, while in some stores small, well-made wooden rakes are regularly provided.

Observers for THE COMMERCIAL VEHICLE have often noticed, however, that the effect of sudden braking or of running down grade is to cause the back packages to creep forward, which suggests an inclined bottom to the truck or an endless belt over the floor to positively effect this forward movement.

Such a method, however, is only practicable where the amount of load does not exceed what can be spread conveniently upon the floor of the body, for if the packages are several deep the inconvenience is great and delay serious. Lately the use of shelves for additional package room has increased. These shelves are of various types, from full-width shelves extending the full length of the load space to mere corner brackets. Two types, however, are in the greatest favor.

The first and most common is a transverse shelf about half the length of the load space. This shelf moves forward to afford access, and generally carries the last packages to be delivered. It has the disadvantage, where rear loading is practiced, of preventing the crew from reaching the cab from the loading platform, which may conceivably save time. There are also occasions when it is necessary for the driver to walk back to the tailboard to assist the helper in taking off a heavy package, at which time the transverse shelf is an unqualified nuisance.

Another type which is equally as capacious, but less inconvenient, extends the full length of the body but only half-way across. This permits the men to walk through the body, but it renders




White 1,500-pounder owned by the Joseph Horne Co., Pittsburgh, equipped with a screen-sided body and inside trays for segregating the packages to be delivered in different areas

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A 1,000-pound C. T. electric used by Strawbridge & Clothier, in Philadelphia

the rear half of the shelf inaccessible. If rear doors are used, however, it is believed to be the preferable type. If front loading and unloading are adhered to, the transverse shelf is the best.

There seems to be no good reason why front loading and unloading should not be employed on all light delivery trucks unless groceries are delivered in such vehicles or unless they are of the combination type, delivering bulky goods as well as dry goods, when rear loading and unloading becomes a necessity.

Some stores used rear doors solely because of the lengthy packages such as rolls of linoleum, carpet, etc., which they must carry. A better way, from the standpoints of convenience, safety and the well-being of the truck, is to have racks along the sides of the body.

The Clearing House Parcel Delivery Co., in Boston, which does much of the suburban delivery for the Boston stores, employs racks of this character, as does the May Co., in Cleveland. The longest pieces are placed on the left side, extending beyond the cab, if necessary, since one usually gets in or out of a left-driven truck on the right side. Shorter pieces are laid in the rack on the right side.

There seems to be no agreement among department stores as to whether the flush panel body or the screen-sided one is preferable for dry goods delivery. The screen body has the advantage of admitting more light in the daytime, but the great disadvantage of not being water-tight or wind-proof, in spite of rolled curtains. The appearance of a panel body is greatly in its favor, while ample cab windows and generous ones in the rear provide all the light really needed.

One more feature of the delivery body that should receive attention is the seat. In many instances the seat is made only wide enough for two persons, merely for the sake of appearance. This is a mistake. Every department store at some time encounters rush seasons when the use of two helpers permits much time to be saved with genuine economy as a result.

There is another type of delivery body which finds its usefulness principally among the smaller stores. This is the combination type adapted to use in delivering both furniture and bulky articles and dry goods parcels. There are several forms of combination bodies, but most of them are divided into two sections, a forward portion for parcels and a rear deck for furniture.

Bamberger's, in Newark, employs several of this type of body with great success, and Mandel Bros., of Chicago, employ several of these. They are used principally on suburban runs by these stores, where the volume of sales in either the package or bulky classes, con-

At the top, a good example of a transfer body, with screened sides, side doors and tailgate. Below, a combination package and bulk body used by Mandel Bros., Chicago, and mounted on a 1½-ton White

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sidered on a basis of mileage to be traversed in effecting deliveries, does not amount to enough to make up full loads for two vehicles, one of each class, on the same routes. To cater to such trade with two vehicles would then require either that fractional loads be carried most of the time or that the frequency of delivery be lessened.

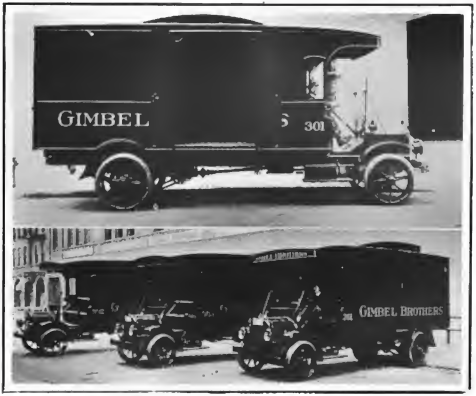
Either course is hateful to the progressive department store, and yet this condition is found to an alarming extent at times in smaller centers. The combination body is a happy remedy for this condition.

The package section is preferably inclosed in a panel ,with its bottom somewhat higher than the floor. This gives ample protection to the load, it makes a neater body, it permits access to the packages without bending down over the seat-backs and reserves extra space below for protruding ends of rolls of carpet, etc. The space in the back is usually arranged in some conventional manner as usually found in furniture trucks.

On the Bamberger trucks, the sides are open, with upholstered edges, to permit portions of the furniture to protrude beyond, if necessary, but on the Mandel body, screened sides are used for the full length. The screens seem unnecessary, as panels would be no more in the way, would give better protection and present a better aspect. An improvement which might be made on either of these bodies is the addition of a side door on the right side of the furniture compartment, which would obviate the necessity of the truck backing to the curb in making furniture deliveries.

There is little to say of furniture bodies except as to the mooted question of screened sides vs. panel sides. Gimbel Bros. have adopted an all-steel closed van for both furniture and transfer work, after designs by their garage superintendent, Charles A. Duerr.

An especial feature of merit in connection with these bodies is their side doors. A common objection to side doors, notwithstanding their convenience, is that they are unsightly. In Mr. Duerr's design they are practically invisible when closed, thanks to the clean-cut flush sides made possible by the steel construction.




The three 3-ton White transfer trucks used by Gimbel Bros. in New York City, which are equipped with especially large sheet steel bodies with both rear and side doors. The upper view shows how the body is made up of separate panels. The lower view shows the three vehicles lined up at the garage

Demountable furniture bodies are much needed in some installations, to reduce the loading time. It is customary in most stores nowadays to load the furniture at a warehouse remote from the store, so that the installation of the proper telpherage equipment might easily be eompassed. The demountable body would have the additional advantage of permitting the packers, who know best how furniture should be protected, to do the actual loading, piece by piece, as it is packed indoors, and without danger of damage from the elements.

Transfer bodies are of various types, the most common being a simple van into which the packages are thrown indiscriminately. Lately, however, with the growing practice of sorting sub-station loads in the main store shipping room, trunks and hampers have been employed as containers of the individual route loads. As between hampers and trunks, there is no comparison. In first cost the hampers are cheaper, but they are not durable and a good fibre trunk is the cheaper in the end. Trunks may be locked, while hampers cannot be safely secured against the pilferer.

With the coming of trunk transfer has vanished the necessity for a closed body on the transfer trucks. Marshall Field & Co. accordingly employ open rack trucks over which tarpaulins may

At the left, a 1½-ton Federal with a furniture body, used by the Marshall Field & Co., Chicago, and at the right, a Mack 2-tonner fitted with an open furniture body, owned by the Rothschild company, also in Chicago

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be spread on rainy or snowy days to give the slight protection needed. Ginbels', nevertheless, use full panel bodies similar to the Duerr furniture types, but on heavier chassis for the transfer of trunks to sub-stations. The use of a closed van has the advantage of permitting the truck to be used for furniture, if need be, during the day and for transfer work during the night, but as against this the open body is convenient for freight work, which the closed van is not. Appearance, if this counts for anything on deserted streets after dark, is with the closed van.

A virgin field is open for development, however, in the demountable transfer body. It does not take long to take on a load of trunks nor to discharge such a load, but the great difficulty is in providing facilities for the loading operation at the plant. A demountable body might be strung up on a telpher and loaded as opportunity permitted, but dropped onto the chassis the instant it arrived.

The nest body opens up similar possibilities, and has been used with success by the Wanamaker stores. Wanamaker, likewise, as well as the May Co. in Cleveland, uses trailers in rush seasons to double the capacity of its transfer trucks.

This suggests that possibly by the more extensive use of trailers transfer trucks might be eliminated entirely, the furniture trucks taking out their loads of furniture at night with the loaded transfer trailers in tow and then waiting the night at the sub-station garage.

There is also an opportunity for some enterprising designer to devise a sectional bookcase body, each section consisting of a nest for the delivery truck and taking the place of the driver's bin in the shipping room. These nests would hold each a full truckload of up to 1,500 pounds. They could be speedily moved about on their own casters and loaded into the skeleton transfer truck or trailer body. At the sub-station they could be shunted into the delivery vehicle's body and no time lost in re-checking the load. Such a nest need not be the entire height of the body, but need be only as high as the actual load, the top being on hinges to fold out of the way while on the route.

# Chassis For All Delivery Uses

## The Type of Vehicle Required Depends Upon Class of Service to Be Performed

COMMERCIAL VEHICLE chassis for department store work embrace practically all sizes and types. Both electric and gasoline vehicles are used extensively, and in every capacity from the 300-pound motorcycle carrier to the 5-ton truck. Each type and size of chassis has its own particular purpose and field, and the efficiency of an installation of commercial vehicles depends very largely upon the suitability of the chassis selected to the work required of them.

Electric trucks are useful principally where the mileages are moderate—within possibly 35 or 40 miles, and where the stops are frequent and close together. The electric is the most convenient and simple vehicle to operate; it can start and stop most readily and it consumes no power, outside of lighting current, after dark, when standing. It may be operated in the densest traffic and at minimum speeds without injury. For this reason it rather than the gasoline machine, is replacing the horse in work in apartment house and congested districts and at the freight terminals and warehouses of the city.

The gasoline machine is the cheapest to buy, the lightest and the swiftest, and is therefore best adapted to delivery on medium to long hauls; in other words, wherever the electric is unadapted on account of its being too slow, of insufficient mileage capability or too expensive for work which a gasoline machine can do economically.

The line between these two spheres is very difficult to draw definitely, and it will vary according to local conditions. Experience is the best measure, but this, unfortunately, is not easily or cheaply bought. The best guide is to use the gasoline machine on all routes whose mileage exceeds the mileage capacity of an electric vehicle, and the electric on shorter runs, being sure, however, that no haul is restricted in mileage merely because horses formerly were unable to endure longer runs.

If a route is, for example, 30 miles in length on the average, it should take a vehicle of any type a full day, working at the normal rate, to cover it. If it is found that a gasoline vehicle can be depended upon to cover such a route regularly in half a day, it should be doubled up with another of equal length and one gasoline truck put on it in preference to two electrics.

As to capacity, there has been a strong tendency toward over-capacity in the selection of trucks for dry goods delivery which may or may not be a serious condition. It was largely due to the fact that the machines available on the market were formerly ill-suited to the needs of dry goods delivery in capacity. They were at least as heavy, if not heavier, than seven-passenger touring cars, and were therefore sprung and designed for loads of 1,500 pounds and up. In size, the mistake was made of building them to accommodate bodies too small for their capacity loads of the very light goods dealt in by department stores.

Rebuilt touring car chassis have not always proven successful for delivery use, and almost never are supplied with other than the pneumatic tires for which they were designed.

### Lighter Chassis Needed

Lately, however, manufacturers have awakened to the need of lighter chassis for delivery purposes. The average department store load does not exceed 500 pounds. Manufacturers have observed this and today there are several makes of high-grade delivery vehicles of 1,000 pounds capacity. Makers of no smaller vehicle than 1,500 pounds to 1½ tons have adopted lighter springs for department store work, which practically convert such chassis to heavy-weight ½-tonners.

The mistake has been made by some stores of securing heavier chassis than this, even up to 2 tons, in order to accommodate larger bodies for heavy runs. Such buyers would do well to weigh the loads in these big bodies and then speculate on the possibility of applying these large bodies to lighter chassis.

The difficulty seems to be that commercial vehicle chassis are designed for loads rated in pounds and built for a capacity load of average density, while dry goods loads are of less than average density. To secure a chassis of sufficient size to carry the number of packages which can be delivered on a route in a day it is necessary to employ a chassis whose capacity in pounds is considerably greater than the weight of such a load.

### Pneumatic Tires for Speed

Pneumatic tires are to be advised in package work for gasoline vehicles, for these permit of greater speed and are economical because they protect the mechanism from shock and vibration, so that repair bills are greatly reduced over what they would be were solid tires used at the necessary speeds for efficiency.

Electrics may use solid tires, for their speeds are not great enough to do serious damage nor are the parts of an electric chassis as susceptible to damage from vibration.

The use of electric starting and lighting systems on dry goods trucks is to be advised, for electric starting saves time in starting and stopping and removes the temptation for the driver to leave his motor running while waiting, which he is likely to do rather than get

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out and crank the motor by hand at each stop.

Electric lighting is more convenient and it permits the inside of the body to be well lighted conveniently, a necessity in night delivering.

# Truck Wins Against Railroad

### RATES LOWERED DUE TO TRUCK COMPETITION

LOUISVILLE, KY., September 24—Competition with motor trucks has forced the Cincinnati-Flemingsburg & Southwestern railroad to appeal to the Kentucky State Railroad Commission for permission to reduce its rate on short-haul freight.

This is the first exemption from the long- and short-haul clause on account of conditions arising from competition between a railroad and motor trucks. This clause forbids a lower freight rate from one point to another than is charged to intermediate points. An order has been filed by the commission exempting the railroad from the provisions of this clause, which order is subject to a re-opening of the case upon 10 days' notice after any complaint is filed.

It was shown that by reason of the operation of a motor truck between Maysville and Flemingsburg, revenues of the 3-mile railroad line, making but one point, Flemingsburg, have been reduced more than 50 per cent, and this competition is a matter of life or death with it.

# TechnicalKnowledge Aids Sales

### HOW TECHNICAL KNOWLEDGE OF THEIR PRODUCT HELPS MOTOR TRUCK SALESMEN

NEW YORK CITY, September 21—The R. E. Taylor Corp., eastern distributor of the Garford truck in this city, yesterday afternoon held its weekly meeting of the sales representatives, and J. Edward Schipper, secretary of the Metropolitan Section of the Society of Automobile Engineers and technical editor of *The Automobile*, gave a talk on "How Technical Knowledge of Their Product Helps Motor Truck Salesmen."

The following gives a few important points brought out in the talk:

"You must first know your product and secondly, you must know the proper methods of application. Thus, technical knowledge as applied to the selling of motor trucks is not a mere comprehension of the theories and practice of the construction of your vehicle, but a two-fold affair in which the knowledge necessary is broadly divided under two different heads. First a technical knowledge of your manufacturer's line and second a technical knowledge of the problems of transportation in all their various ramifications.

"Regarding the technical knowledge of your product, the first question to answer is, 'How far must we go?' To answer this, it is only necessary to examine the purposes of this branch of technical knowledge. What are they? First, and most important, is the knowledge of the factors of your vehicle which go to make up its capacity. That word capacity, gentlemen, is a broad term and a much abused one, and this is the first use to which a proper technical knowledge on the part of a motor truck salesman should be put. If all salesmen were technically informed regarding the product which they are marketing, the abuse of capacity ratings would be unheard of.

"This will give some hint of the direction which a technical knowledge of your manufacturer's product should, in my opinion, take. Learn the various factors which go to make up a certain capacity for your vehicle. When the engineers start the first thing they must know before designing a car is what capacity it is to carry. Your line of thought should follow the same course. Knowing the capacity you can readily study the construction and design of the car which allow it to accomplish the work it is supposed to do. Generalities will not stand before the keen investigation of a prospect who closely scans the vehicle offered him for sale.

"Regarding the second branch of technical knowledge, that in meeting the transportation problems of your prospect, you enter a broad field. It is not too much to say that every commercial vehicle salesman should be potentially a transportation engineer. In a large majority of cases you are called upon not to sell a motor truck but to sell a transportation system. This is especially true where your prospect is a horse owner. Here he must throw away the entire system formerly employed with horses and start afresh. You cannot successfully put a motor vehicle in a horse delivery system. It will not work efficiently.

"Again, a square peg in a round hole is an excellent fit compared with some of the square commercial cars in the round holes of many transportation systems now in use. (Salesman has many opportunities due to his experience to make himself a friend in need.) Capacity, speed and power are three variable quantities which are the tools with which a man must work in the motor truck field if he desires to meet the requirements presented to him by the various problems of transportation. Here is where the motor truck salesman can do his greatest work for the industry. The right truck in the right place, doing the right work, hauling the proper loads, the proper distance considering the design of the truck itself, its cost of operation and the value of the product carried, is a joy to the heart of its owner. On the other hand, a truck of the wrong capacity, making hauls of a length which allow its empty travel to overbalance its pay trips, can be such a thorn in the side of the owner that he longs for the day of the good old horse.

### Service Conditions Important

"Long hauls, short hauls, constant loads, varying loads, hilly country, city traffic and a thousand and one other factors all enter into the choice of a business vehicle. They are all features which govern requirements. Before any thought of what particular truck capacity will suit this prospect or that one, all these factors must be carefully weighed in reaching a conclusion. The number of cars needed for a fleet are only determined after all these things are considered. It is the motor truck salesman who should be able to go into the office of the prospective customer and by studying carefully his delivery routes and costs, should be have had horse equipment, plan a transportation system which will efficiently solve the problems and save actual money to the owner.

"You have got to show a man how he can save money in order to sell him a transportation system which is different from that now employed. This means that you must become familiar with all the intricate workings of his delivery or transportation system. Many questions enter—upkeep, cost of space, men and you know what-all. With a passenger car it is a different proposition. A man will see a car he likes and if there is a difference of $600 or $700 between that and another this will not stand in his way. On the other hand, with a commercial vehicle a buyer demands the most work for the smallest amount of money. This does not mean that the initial cost of the vehicle is lowest, but it does mean that when the year's books are gone over the figures for haulage are at a minimum.

"Before a commercial vehicle salesman can accomplish this result he must have made a study of the transportation problems presented by the prospect. Before he can make an efficient study of these problems he must have the necessary ground work of technical knowledge of his product to enable him to know positively what the performance can be expected to equal under varying conditions of distance and load.

### Refuse Mis-sales

"In fact, a step further than this should be made. It may seem radical to say this, but to a far-sighted concern expecting to remain perpetually in business it is part of the necessary program. Should your truck not fill the bill, do not sell it. It is worth more to a successful concern to have every vehicle efficiently performing the service which it has been sold for than the small amount of money lost by passing up a sale when a thorough investigation shows that either due to the unreasonable demands of the prospect or to the peculiar requirements of the job that the truck will not fill it. On the other hand, with a large and varied line of vehicles this state of affairs will seldom be reached unless the demands of the prospect are beyond fulfillment.

"Not very long ago an instance occurred which very clearly brings out the force of the above statement. A certain individual wanted a truck to carry a load which sometimes ran as high as 4½ and 5 tons. According to this individual all that he could afford was a 3½-ton truck and he would buy no larger, although told that his truck could not stand the overload and last; he said that he intended to overload it in spite of the advice of the manufacturers and the violation of the guarantee, which he proceeded to do. Did this truck salesman do right in selling this man the truck? Unquestionably he did not, for although that man knew his truck was overloaded his neighbors and the people in the street did not. After a period of use, when the truck began to break down at frequent intervals, it can be certainly believed that it did not form a desirable advertisement for th manufacturers of that vehicle. Can you imagine people suggesting to one of this man's neighbors who intended to purchase a truck that he should buy a truck of this manufacturer? What would happen? Their advice would be waived aside and this neighbor would say, 'That would be about the last make of truck that I would buy.' Mr. Blank, on our street, owns a truck of that make and for the past few months he has had nothing but trouble with it.'

"Technical knowledge on the part of the motor truck salesman will guard against overload because if he applies this knowledge he can readily convince a prospect of the fallacy of buying a truck too small for its intended purposes. The policy of building a car of a certain capacity and then rating it below that capacity in order to compensate for those who misuse their vehicles is such an injustice to those who obey the rating given with the car that it is little wonder that this policy has been abandoned."

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## The Psychology of Efficiency

EFFICIENCY is as much a matter of state of mind as of physical conditions. We are all too apt to be ultra-conservative in matters which we do not understand because it is easier for the mind to find justification of standing pat than to reason out the logic of improvement.

Recently a department store using trucks extensively adopted a scheme by which one of the most tedious clerical delays of the shipping room was eliminated. It was new. Nearly everyone yawned and said it could not be done. A few rival stores, however, got hold of the idea and tried it out. Some of these found it successful and others abandoned it and went back to the old, tedious way of doing things.

As a simple clerical operation, local differences in conditions and environment had little to do with whether the system would be successful or a failure All of the stores used the system in exactly the same way, in all important features.

The originator of the system was asked to account for the abandonment of it after trial by one of the largest stores in the country. His reply follows:

"It is the tendency of many persons to become wedded to old ideals and methods. Any new method which such persons may be induced to attempt is bound not to be successful because these parties have already decided in their own minds that it will not succeed."

Being convinced beforehand that one cannot successfully do a thing is to insure failure. The will to succeed and the belief in the possibility of improvement are the psychological attributes that are indispensible to efficient work.

There have been a few failures and a great many striking successes in the installation of motor trucks in department store delivery. On preceding pages are given many of the vital reasons for the attainment or failure to realize economy in motor delivery of dry goods. The psychological feature cannot be tabulated. It cannot be put into concrete form, yet it is of the utmost importance.

If you use trucks, believe in them, and in that faith physical improvements will be easy.

## It Beats the Cars

FREIGHT TRANSPORTATION by commercial vehicle instead of by railroad is one of the most interesting developments of motor haulage of recent times. As freight terminals and city trackage become more congested by a growing volume of traffic without possibility of adequately expanding the space available, it becomes increasingly difficult for the railroads to transport small lots of freight for short distances with speed or economy. As experience and confidence in the motor truck grow its usefulness in the general transportation scheme becomes correspondingly greater.

Repeatedly have the railroads complained to the Interstate Commerce Commission that these short hauls do not pay, and yet they are obligatory on them as common carriers. No end of trouble has been stirred up by the continual complaints of shippers on slow delivery of goods which have to be shipped but a few miles. The retardation and congestion which results from the intricate switching and transferring operations in our cities has materially affected long-haul traffic.

Merchants who have been used to making shipments from suburban plants and warehouses to more centrally-located warerooms and stores; supply firms which habitually ship their consignments to local buyers by rail; and others who are consignees of goods from so-called foreign rail lines have had to put up with more and more delay as conditions became more intolerable. Many firms which should long ago have moved into larger quarters less centrally located have hesitated because of the delay incident to having freight transferred through the city.

The motor truck has come to the rescue by hauling such lots of freight direct, either from their point of original shipment to the ultimate consignee or else from a central receiving terminal, the whole haul taking only a few hours and being accomplished in many cases for less than the railroad charges, unprofitable as they are.

With the development of tractors larger loads can be safely and economically handled on the highways. When business men have become really awake to the advantages of motor haulage for everything less than what amounts to overland transportation, the railroads' short-haul problem will have been solved by extinction.

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# His Fellow Feeling Solved the Driver Problem

DYNAMIC, a hard worker and a student of human nature, Ernest Kummer, the delivery superintendent of the Crowley-Milner & Co. department store in Detroit, has been able to keep his delivery equipment pace with the city's marvelous growth by the co-operation which he has instilled into his shipping room crew and his vehicle drivers. He has direct charge of all packages as soon as they reach the shipping room and is also directly responsible for the company's vehicular equipment and its drivers.

The Crowley-Milner company used horses exclusively for making its deliveries prior to 1912, when Detroit's rapid growth and a corresponding growth in the city's dry goods trade, made it imperative to use motor vehicles for quick deliveries in the many residence sections scattered among the city's suburbs.

The advent of the motor trucks with their great ground-covering ability as compared with the horse wagons formerly used, made necessary a complete change in the delivery system, both inside the store and out. Kummer was held responsible for either the success or failure of the trucks. He had to watch the handling of the packages inside the store. He had to watch the routing of the trucks and see that the truck best suited to the work was used in its proper place. He had to be on the go all the time. He was here now and there the next minute. He was dynamic. To keep pace with the growth of his store's business he has had to be dynamic ever since.

When Kummer took hold of the Crowley-Milner delivery system he knew nothing about inside systems or of motor vehicles. He was formerly a salesman in the Toledo, O., store of the same company. He was a salesman in the Detroit store for some time before he took charge of the delivery work. He had to learn all he could about motor vehicles first hand.

His experience as a salesman made him a good student of human nature. He was able to judge the worth of his men and get them to do things the way he wanted them done and at the same time make them think that it was their own way.

After he had the system as used well in mind and knew its every phase, he made a retrospect of the whole. He could not overcome the physical drawbacks of the store because it was designed and built long before the use of motor vehicles was considered, and for this reason had no special provisions for their most efficient use. The manner of operation and the maintenance of his vehicles could be changed. He proceeded to change these methods so as to produce better results.

One of the greatest problems he had to overcome was the lack of interest of the drivers. They had no pride in their work. If they were caught loafing or wasting time in making deliveries or loading their trucks and reprimanded for it, they would quit work, walk around the corner and get another job with another store at the same salary they were getting from him.

Being a good student of human nature, it was not long before Kummer found a method to solve this problem. He decided to pay his drivers and helpers more than they could get in any other department store in the city for the same work and to increase their pay from year to year as they became more expert in handling the routes and making the deliveries in the least possible time consistent with courteous service to the customers.

Every new driver starts to work at $12 per week on the horse wagons. He gets this same salary as long as he remains on the wagon. But if he is deserving, he becomes a driver of one of the electric trucks as soon as a vacancy occurs and is started at $13 per week. From the electric he is promoted to the gasoline trucks at the same rate of pay. While Kummer saw that this would create interest to get ahead from the horse wagons to the trucks, it did not take care of the driver's continued interest once he had a truck.

To sustain this interest and the good work which generally goes with it, he now pays each truck driver $1 per week additional for each year of service with the company, up to a total weekly salary of $18.

This method of promotion with increased pay has enabled Kummer to get his pick of the drivers and to keep them. Now there is none of the former tendency to quit at the least reprimand, for each driver knows that he cannot make as much in any of the other stores. His interest is also sustained for at least 5 years, or up to the 18-dollar-per-week limit, and this is sufficient, for the great majority of the drivers are fairly young men who turn to more congenial occupations after a few years when the lure of driving a motor vehicle has somewhat worn off due to continued hardships of the cold winter days and long hours.

Another problem which Kummer had to solve was to see that the trucks got the proper care. Previously, the driver of each truck was responsible for the proper condition of his own vehicle. Kummer found that in practically all cases, a good driver and a good delivery man, that is, one who knew how to deliver the packages quickly, was a very poor mechanic and could not be depended upon to keep his vehicle in proper trim. For this reason, he hired two expert mechanics for his garage, one to take full charge of the electrics and the other of the gasoline trucks. These two men are directly responsible for all of the trucks being ready for work each day.

(Continued on page 41)

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# Truck Duty in France —Not England

## Trucks Exempt from British Tax—French Demand 45%

LONDON, ENG., September 29—In the drastic measures adopted by Reginald McKenna, Chancellor of the Exchequer of Great Britain, motor cars and parts have been subjected to a duty of 33⅓ per cent *ad valorem*.

Josia Wedgwood, Liberal and single-taxer, protested against commercial vehicles being included in this tariff, declaring that nothing had so helped to economize labor as the importation of motor cars from America.

The Chancellor, in deference to this sentiment, therefore exempted commercial vehicles from the duty, together with their parts.

Dealers in motor vehicles of American manufacture, who, deprived of the supply of British-built vehicles to which they were used, have adopted the agencies for American products instead, have raised a storm of protest, for the measure will mean a hardship not only to American manufacturers but also to the British dealers who have been supplying trucks to British users.

Without the supply of American trucks which the Allies have had access to, it is pointed out, the successful operations of the armies might have been seriously crippled, while at home the American trucks placed on sale have been little short of a Godsend to English merchants and tradesmen who had their vehicles taken away from them at the beginning of hostilities and were unable to buy other British chassis to replace them owing to the tying up of outputs by the War Office.

### FRENCH IMPOSE 45% DUTY

PARIS, FRANCE, September 27—*Special cable to* THE COMMERCIAL VEHICLE—It was learned here today that the French government is shortly to impose a duty of 45 per cent *ad valorem* on motor trucks and parts not purchased by the government itself.

This is taken to indicate that shortly French builders will be able to re-enter the home market and while there has been practically no attempt on the part of American manufacturers to compete with French makers, it is a bulwark against the feared competition which the English have experienced.

### S. O. PRICE RAISED IN K. C.

KANSAS CITY, MO., September 22—The Standard Oil Co. met the increase in the price of gasoline established by the independents. On September 16, the Standard announced a 1-cent rise in the Kansas City market, and now both independents and Standard are getting 9.8 cents a gallon.

### S. O. RAISES ST. LOUIS PRICE

ST. LOUIS, MO., September 17—The increase in the price of gasoline in this city by the Standard Oil Co., which the independents have been waiting for, has been made. The Standard Oil Co. has raised its price per gallon 1 cent. The local branch of that company is now selling Red Crown gasoline for 9.9 cents a gallon.

The independents had filed a protest with President Woodrow Wilson against the methods of S. O. company, which would not meet the recent rise of the independents to 10 cents a gallon. The complainant claimed that the Standard Oil company was trying to crush competition in Missouri by cutting its prices.

### BROWN & SHARPE FOUNDRYMEN STRIKE

PROVIDENCE, R. I., September 24—Two hundred men in the foundry of the Brown & Sharpe Co. joined the strike declared against the plant by the machinists several days ago.

### 8-HOUR DAY FOR STUDEBAKER

DETROIT, MICH., September 18—The Studebaker Corp. today announced an 8-hour working schedule, to be in force in the Detroit plants starting with November 1.

### KNOX DAY 8 HOURS

SPRINGFIELD, MASS., September 23—The Knox Motors Co., this city, employing 400 machinists, has granted an 8-hour working day without loss of pay to its employes, to go into effect October 4.

### KELLY WORKERS GET RAISE

SPRINGFIELD, O., September 18—A 10 per cent wage increase has been given the employes of the Kelly-Springfield Motor Truck Co. The number of men affected by the increase is about 400.

### BETHLEHEM PLUG'S WAR ORDER

NEW YORK CITY, September 21—During the past two weeks more than 100,000 Bethlehem five point spark plugs have been shipped to the war departments of three of the European countries now at war.

### Coming Commercial Vehicle Events

Oct. 4-14.....Wichita, Kan., Motor Exhibition, International Wheat Show.
Oct. 6-16.....New York City, Electrical Exposition & Motor Show, Grand Central Palace.
Oct. 11-12.....Dayton, O., National Paving Brick Mfrs.' Assn., annual meeting.
Oct. 14.....Chicago, S. A. E. Standards Committee Meeting.
Oct. 18-19.....Cleveland, O., Convention Electric Vehicle Assn. of America, Hotel Statler.
Oct. 19-20.....Detroit, Mich., Safety First Convention, Safety First Federation of America.
Nov. 29-Dec. 4..Electrical Prosperity Week.

1916

Jan. 29-Feb. 5...Columbus, O., Motor Vehicle Show.
Jan. 29-Feb. 5...Minneapolis, Minn., Motor Vehicle Show.
March 4-11.....Boston, Mass., Motor Vehicle Show, Mechanics' Hall.

# Beaver Trucks Number 2,610 to June

## Michigan Uses 109 Makes of Commercial Vehicle

DETROIT, MICH., September 16—Commercial vehicle licenses numbering 2,610 were issued by the Secretary of State of Michigan from January 1 to June 30, 1915. Of this number 111 were electrics. There were 102 different makes of gasoline commercial vehicles and 7 of the electric type. Ten of the leading makes were as follows: I-H-C, 324; G. M. C., 259; Federal, 228; Republic, 127; Universal, 144; Packard, 120; Commerce, 117; Reo, 82; Durant-Dort, 91; and Horner, 61. The Detroit Electric, G. V. and Baker led respectively, with 55, 16 and 22.

### LAND YACHT IN CHICAGO

CHICAGO, ILL., September 20—Roland R. Conklin's land yacht, described in THE COMMERCIAL VEHICLE of September 1, arrived in this city today, having been on the road 1 day less than a month out of its home port, New York City.

### NEWARK JITNEY BILL VETOED

NEWARK, N. J., September 16—Mayor T. L. Raymond today sent to the Board of Works his disproval of the ordinance drawn by that body regulating jitney buses. The mayor said it contained features which may be unjust to the jitney owners.

### NEW N. Y. LAW REQUIRES ALL DRIVERS LICENSED

NEW YORK CITY, September 20—The next Legislature will be asked to enact a law requiring that all motor drivers be licensed after a qualifying examination. It is stated that more than half of the fatal automobile accidents in this city are probably due to the inefficiency of owners or members of the families of owners and in many cases the inefficiency is due to incurable physical defects or to practically unalterable psychological disqualifications.

### VACUUM OIL ADDS

ROCHESTER, N. Y., September 20—The Vacuum Oil Co. will build another addition to the local plant. It will be a filter building and will cost $17,000. This will bring the company's expenditures for improvements this year up to $210,000. It plans to spend $500,000 in improvements in the next year.

### 35% WALPOLE DIVIDEND

BOSTON, MASS., September 27—Judge Dodge in the U. S. district court has allowed a seventh dividend amounting to 35 per cent to all creditors of the Walpole Tire & Rubber Co. This brings the total dividends to 85 per cent.

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# White Capital Grows to $8,000,000

## Almost Entire Interest Remains in the White Family

CLEVELAND, O., September 24—Following a reduction in capital stock on September 22 from $3,000,000 to $2,500,000, the White Co., this city, has filed an application for an increase to $8,000,000.

These changes are in line with the recent announcement by which notice was given of the calling of $500,000 preferred and the issue of an enlarged preferred stock which will be distributed among members of the White organization who desire to retain their investment, but to drop out of the active management. Holders of the old preferred were also given rights to the new preferred. The public interest is limited to $500,000 of preferred, all of the remaining stock being held by the White family.

### REO BUILDS 1,510 TRUCKS

LANSING, MICH., September 18—The Reo Motor Truck Co. produced during the business year ending September 15, 1,510 trucks.

### THREE NEW ALMA BUILDINGS

ALMA, MICH., September 8—The Republic Motor Truck Co. has started the erection of three new plants, which will provide a total of 54,500 more square feet of floor space. Work on the latest addition was begun recently. This structure will be one story high and have 35,000 square feet of floor space. Fifty more men will be employed.

### GRAMM CAPITAL NOW $2,500,000

LIMA, O., September 27—In accordance with the policy of expansion announced by the Gramm Motor Truck Co., papers have been filed with the secretary of state increasing the authorized capital of the company from $1,250,000 to $2,500,000. Only a portion of the stock will be disposed of at this time.

### MORTON CAPITAL INCREASED

HARRISBURG, PA., September 16—The Morton Truck & Tractor Co., this city, has increased its capital from $100,000 to $1,000,000.

### NEW DART TRUCK MODELS

WATERLOO, IA., September 27—The Dart Motor Truck Co., this city, announced three new models at its annual meeting of the stockholders, where a 7 per cent cash dividend was declared on the preferred and a 30 per cent increase in business over last year was reported.

The three new models are as follows: One a small model of 750 pounds capacity, having a 3¼ by 4-inch motor, unit power plant, Disco electric starting and lighting system, 30 by 3½-inch pneumatic tires mounted on demountable rims, 100-inch wheelbase, selling with express body for $675. Also a ¾-ton worm-drive, using a Buda motor, 3½ by 5⅛-inch, with unit power plant, 124-inch wheelbase, 36 by 3-inch front and 36 by 3½-inch rear solid tires or 36 by 4-inch front and 36 by 4½-inch rear pneumatic tires on demountable rims, optionally, at the same price, $1,300 for chassis alone. Also a 2- to 2½-ton worm-driven, 4⅛ by 5½-inch motor, unit power plant, 150-inch wheelbase, 36 by 4-inch front and 36 by 4-inch dual rear tires, using steel wheels, price $2,100.

A board of directors was elected, which in turn elected the following officers for the ensuing year: C. W. Hellen, president and general manager; W. A. Baxter, vice president and sales manager; E. L. Stover, secretary, and C. C. Wolf, treasurer.

### BALDWIN BUILDS TRUCKS

PHILADELPHIA, PA., September 17—The Baldwin Locomotive Works is building 300 trucks for use by the Russian army. It is understood that more trucks will be built later and that the 20-acre plant the company is building will probably be used in carrying out the large war order.

The trucks being built, fifty of which are already finished, run on flat iron wheels ridged to prevent skidding. When in use, several small trailers will be attached. They will be used to transport foodstuffs and merchandise to railroad and water terminals during the war, as well as to haul munitions.

### CANADIAN FORD TO BUILD TRACTORS

DETROIT, MICH., September 16—The Ford Motor Co. of Canada, Ltd., will build Ford tractors. A plant is to be erected soon which will employ 5,000 to 10,000 men. It is stated that the plant will be in operation in about 1 year.

### NEW WISCONSIN TRACTOR

OSHKOSH, WIS., September 17—A tractor using a gas-kerosene carburetor and electric lighting is to be built by A. J. and O. G. Patch, this city, for 10 years associated with the Rumely and Fairbanks-Morse interests as tractor designers.

### SPLITDORF ELECTRIC BUYS $1,000,000 PLANT

NEWARK, N. J., September 24—The purchase for $1,000,000 of the Sumter Electrical Co., Sumter, S. C., by the Splitdorf Electrical Co., this city, has been closed. This new plant will be used to produce magnetos of every type, including low-tension types for use on stationary, marine and tractor engines.

The company is building nearly 1,500 Dixie magnetos a day.

### GOODYEAR TO HIRE 1,000

AKRON, O., September 23—The Goodyear Tire & Rubber Co., this city, has started a house-to-house canvas to find rooms for 1,000 men that the company will bring here within the next 2 weeks. Four new buildings, an addition to the plant, will be put in operation as soon as the company can find men to work in them.

# Edison Develops New Battery Service

## Ward Contracts for Edison on Rental-instalment Plan

NEW YORK CITY, September 27—The Ward Motor Vehicle Co., this city, will offer the Ward Special, a 750-pound delivery truck, for $875 on easy monthly payments, with 1 year's rental of the Edison battery included. This offer will be open only until October 31. The plan is to be tried in Greater New York and New Jersey and may be extended to other cities in the future.

Thomas A. Edison has developed an entirely new method for obtaining cheap delivery service, by renting his alkaline storage battery at a nominal price per month. His plan consists, essentially, in the merchant purchasing his electric delivery vehicle on the instalment plan and hiring the battery to run it at a nominal monthly rental.

### EDISON'S NEW BATTERY PLAN

WEST ORANGE, N. J., September 20—The new storage battery invented by Thomas A. Edison has been exhibited. Arrangements have been completed to market the new battery in light delivery wagons which might be rented by merchants.

The new truck, which was displayed in the laboratory yard at the Edison plant, has a carrying capacity of 750 pounds and a range of travel of 45 miles without recharging. The speed is 10 m. p. h. and is designed to be very simply operated by a single pedal.

### E. V. A. CONVENTION PAPERS ANNOUNCED

CLEVELAND, O., September 27—The Electric Vehicle Assn. of America, which will hold a convention in this city on October 18 and 19, announces the following papers to be read at the meetings:

"Industrial Trucks in the Service of the Pennsylvania Railway Co.," by T. V. Buckwalter, Pennsylvania Railway Co.

"The Electric Taxicab," by I. S. Scrimger, secretary and general manager, Detroit Taxicab & Transfer Co.

"The Edison Battery Service System," by Willis M. Thayer, manager vehicle sales, Hartford Electric Light Co.

"The Function of the Electric Garage," by R. Macrae, of the Commonwealth Edison Co., Chicago.

"Comparative Development of General Power and Commercial Electric Vehicle Loads and Function of Power Salesmen as Electric Vehicle Solicitors," by H. H. Holding, general car representative, and Mr. S. G. Thompson, general electric vehicle representative, Public Service Corp. of New Jersey.

"Problems We Are Facing and How They May Be Met," by George H. Kelly, secretary Baker Raulch & Lang Co., and president Electric Automobile Manufacturers Assn.

"Field for the Small Electric Delivery Vehicle," by Charles A. Ward, secretary-treasurer, Ward Motor Vehicle Co.

"Electric Vehicles in Municipal Service," by Arthur J. Slade, consulting engineer, and R. Duval Dumont, New York Edison Co., New York City.

"The Comparative Operation of Electric and Gasoline Machines in Same Service," by T. D. Pratt, president Motor Truck Club of America, and W. J. Miller, Public Service Corp. of New Jersey.

In addition to the above-mentioned papers valuable reports of the association's officers, 16 Sections, standing and special committees, will be given.

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DETROIT, MICH., September 27—Recognizing the advantage of Detroit as a shipping center, the Hyatt Roller Bearing Co. will construct a large warehouse on the Michigan Central railroad in this city. This will be completed this fall.

H. R. White, who has been connected with the motor car division of the Hyatt company for some time, has been named traffic manager and will have charge of the extensive shipping arrangements.

### S. K. F. FORMED IN CONN.

HARTFORD, CONN., September 16—The S. K. F. Ball Bearing Co., this city, has been incorporated with a capital of $2,000,000 to manufacture and sell ball bearings known by this name and heretofore imported from Sweden.

It is now the intention of the company to build a plant in this city. A suitable factory site of about 8 acres along the New York, New Haven & Hartford Railroad tracks has been acquired and the erection of the first building will be shortly started. Among the directors of the new company will be B. W. Hanson, vice president of Pratt & Whitney, this city. The general selling policy of the company will, however, not in any way be affected by this change, and the executives and other members of the old company will join the new corporation.

It is intended to start with a plant employing about 300 men, which will, to begin with, be able to produce only a portion of the bearings annually sold by the company in this country, the remainder coming from Sweden.

### TRANSMISSION BALL BEARING CO. FORMED

BUFFALO, N. Y., September 16—The Transmission Ball Bearing Co., this city, has been incorporated with a capital of $100,000 to manufacture ball bearings for motors and trucks. The directors of the new company, which is the U. S. branch of the Chapman Double Ball Bearing Co. of Toronto, are W. J. Murray and J. P. Beatty, of Toronto, and W. M. Wilson, of Buffalo. The office of the company is at 1407 West avenue, this city.

### HAYES TRUCK WHEEL FORMED

ST. JOHNS, MICH., September 16—The Hayes Truck Wheel Co., this city, has been formed with a capital of $100,000. This company is using the plant formerly occupied by the St. Johns Table Co. C. B. Hayes, president of the Hayes Wheel Co., Jackson, Mich., is president of the concern.

### TRUCK CLUB OUTING BIGGER THAN EVER

NEW YORK CITY, September 20—The Fourth Annual Outing of the Motor Truck Club of America, held at Whitestone Landing, L. I., last Saturday, was the biggest field event yet held by this organization of motor truck owners. It was attended by seventy-one persons, most of whom made the trip aboard the lighter *Atlantic* donated for the occasion by Haywood Perry Cavarly of the National Lead Co. The events comprised races and games, a shore dinner and prize dancing.

The committee on arrangements consisted of T. D. Pratt, F. Nelson Carle, H. P. Cavarley, R. Duval Dumont, W. C. Andrews, Roderick Stephens, George H. Duck, Joseph Hinson and M. C. Horine.

# War Observer Learns Truck Lessons

## Lack of Clearance and Detail Refinement Troublesome

LONDON, September 10—In a recent visit made by an American truck representative with a military transport to the front in Flanders, an opportunity was afforded of observing the work of motor trucks in the war zone. Since the opening of the war many changes have been made which have increased the efficiency of the trucks. Chief in this regard is the putting men who have had most experience on certain makes of trucks and keeping them driving these makes. It has also been found profitable to keep trucks of the same make as close together as possible in the same convoy, and increasing the size of the convoys to do this. It has been found advisable to have a reserve vehicle accompany convoys, this truck equipped with the necessary spare parts, and skilled mechanics for the particular make of truck used in the convoy.

### External Piping Bad

A frequent trouble with not a few English makes of trucks using force-feed lubrication is that they have the pump in the bottom of the crankcase sump with outside oil pipes delivering the oil from the main bearing to the crankshaft. These external pumps are rapidly broken by vibration, which is immediately followed by loss of oil and in nearly every case burned out bearings follows.

Not sufficient protection is given the ignition system to make it water-proof in several makes of trucks. Bad weather conditions have made many of the roads near the front veritable water bogs, the water splashing through the radiator and then being carried by the fan through the ignition terminals.

On many English makes the road clearance is not sufficient, with the result that the tie rod of the steering gear frequently strikes the ground, throwing the wheels out of line. There are other makes which because of the small clearance really bury themselves in the mud and some with large rear axles which catch the mud have not power enough to drag themselves out.

Some trucks are very much behind in the matter of lubricating the wheels, which in some cases is done by a large grease cup threaded into the outside of the hub. The same is true with universal joints. It is the exception rather than the rule to see grease cups remain in; they all loosen, due to centrifugal force.

Trucks without water pumps are generally boiling all of the time. In fact, cooling is one of the most serious matters with many trucks. This is aggravated by the lack of attention given trucks by many drivers, and also by road conditions.

Another serious fault is that clutches are not sufficiently fool-proof and quite frequently have not a large enough factor of safety to take care of the overloading and poor driving the vehicles are subjected to. In almost 99 out of 100 trucks observed the drivers had their heavy military boot resting equally heavily on the clutch pedals, which meant early trouble.

### Fan Belts Give Trouble

It seems as though the majority of designers have tried to show how heavy they could make the fan and how light or cheaply they could buy the belt. This, coupled with a very inefficient, inaccessable belt adjustment, does not help the cooling situation. Many makers are only beginning to realize that they must have better protection in front of the radiators.

Brake adjustments are very poor, being so frequently in inaccessible places or requiring some special kind of tool, which is invariably lost, to make the adjustment.

So often each particular maker has his own ideas to what particular height the body should be from the ground, with the result that scarcely any two trucks can back up to the same load platform and unload or load heavy crates. In addition, in the same make of trucks there will often be half a dozen different designs of tailboards, and as these invariably get broken there is needless trouble in replacing them.

There is a great scarcity of rubber tires. Scarcely a week ago 150 American trucks of one make were still held in crates at a French port waiting for tires.

### Biting the Hand That Helps

The situation in England with reference to America is quite unusual. The sentiment against American trucks is strong, but it is a dog-in-the-manger attitude, because all of the British makers are booked up with the war department for 6 or 8 months, and as trucks are needed there is no place to get them from but America.

### W. H. GRAY RESIGNS FROM GRAY & DAVIS

BOSTON, MASS., September 21—W. H. Gray, general manager of Gray & Davis, has resigned from that company to take effect October 15. The W. H. Gray is not William Gray, president and treasurer of the company.

A large heat-treating plant has recently been erected which adds to present facilities and this, with other improved manufacturing facilities and constructional alterations in its product, will permit of a considerably increased production of starting-lighting systems for the 1916 trade.

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# Mars Crowns Alcohol

## Gasoline Will Be King of Fuels No Longer After War

## France Faces Revolution in Motor Spirit

By W. F. Bradley

Delahaye traveling repairshop attached to a convoy of twenty-two trucks carrying fodder to cavalry at front

ONE of the unexpected results of the war, so far as France is concerned, will be the abandonment of gasoline in favor of alcohol. Alcohol has never had a commercial use in France, but the military authorities have always kept in view the possibility of its employment in case the supply of imported fuel should be cut off. Thus, in the annual military truck competitions, generally lasting a month, one of the rules was that every truck should run for a third of that time on carbureted alcohol, and should show the same general efficiency as with gasoline or benzol. This requirement necessitated the use of a carbureter which could be adjusted to run equally well on three fuels; it did not call for any modification in the design of motors, although if alcohol alone had been the stipulated fuel it is probable that higher compressions would have been adopted. Despite the fact that the suitability of alcohol was proved, no trucks in ordinary service made use of this fuel, the reason being that the supply was unstable and prices high. This artificial condition was bound to continue so long as the legislative restrictions regarding alcohol remained in force.

### Government Monopoly in 1917

In France, as in other European countries, the war has made possible drastic reforms in the liquor traffic. With practically no opposition from the trade, the French government has been able to announce a tremendous increase in the alcohol tax, the monopolization of denaturized alcohol in 1917, and schemes to encourage the use of alcohol for motor vehicle uses.

In 1900 the duty on pure alcohol was increased by $12.80 per 100 litres—22 gallons. This increased taxation caused an immediate drop in consumption of 8,800,000 gallons. Since 1900 there has been a recovery, without the previous maximum being reached. The new law calls for a further increase of the alcohol tax by $56, which, it is estimated, will cause a drop in consumption of 15,000,000 gallons. The state estimates that its revenue from the alcohol tax will be maintained, and probably increased, by reason of the higher tax and the suppression of the privilege which allowed farmers to distil a certain quantity of alcohol for their own consumption. While the state revenue would not be affected, this drop of 15,000,000 gallons of alcohol per annum would have serious consequences for certain sections of agriculture. It is on this account that the government has decided, in 1917, to monopolize denaturized alcohol and to encourage its use for motor purposes.

This scheme calls for the fixing of the maintenance of supplies and the regulation of prices, the only two causes which have prevented alcohol becoming commercialized. It has not yet been announced what machinery will be set up for the production and sale of government denaturized alcohol. So far as supply is concerned, France can produce all that is required for motor cars, even supposing that the use of gasoline and benzol is eliminated. For the final distribution of alcohol it is probable that arrangements will be made with the present sellers of gasoline, in the same way as licenses are granted for the sale of tobacco and matches, both of which are government monopolies.

### Must Be Cheapest Fuel

Alcohol can only be successfully encouraged on a price basis. Gasoline is now sold in France at an average retail price of 50 to 52 cents per gallon, and averaged 48 cents before the war. This price is entirely artificial, being caused by national and local taxes. Freed from import and refining duties, gasoline could be sold at half present rates, as was the case in Belgium before the war.

### Cannot Coerce Motorists

Benzol, less heavily taxed than gasoline, sold from 35 to 38 cents per gallon in the pre-war days. Thus to make alcohol the national motor fuel it will have to be put on the market at considerably less than the price of benzol. This is quite possible, and fuel at 15 to 20 cents a gallon may be an accomplished fact in France within a couple of years.

Except for army trucks, there appears to be no way by which the government can force the use of alcohol. It is quite possible that the army may insist on all military type subsidy trucks being run on alcohol when undergoing official tests or when brought up for inspection. As past experience has shown, it is impossible, however, to secure the commercial use of alcohol by means of legislation. One thing is certain, that given a cheap fuel and an assurance that supplies will be regular, the whole commercial industry will abandon gasoline even if the change necessitates modifications in the motor or carbureter. There is an example of this in the case of benzol. Although benzol cost only 10 cents per gallon less than gasoline, it was before the war used exclusively on all taxi-

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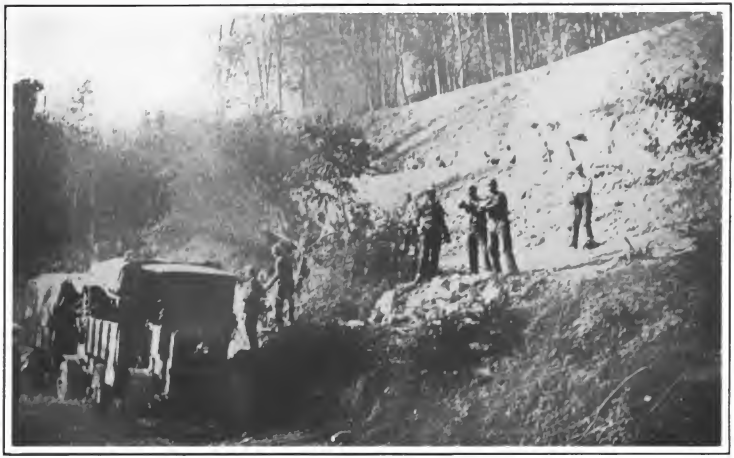

French trucks bringing up men and trenching tools for the excavation of trenches in the Argonne district

cabs, Paris motorbuses and on probably 90 per cent of the motor trucks in France.

Private car owners had not been induced to make the change to the same extent. An impression exists that benzol pits valves and fouls motors to an extent which is not compensated by the lower initial cost of the fuel. The same will apply to any attempt to introduce alcohol. The drop in price will have to be considerable to convert the private motorist. Cheap fuel will be most opportune immediately after the war. Old prejudices have been swept away, the stock of horses has been depleted, businesses are being reorganized, and if in addition to all this fuel can be bought at a quarter the original price there will be an unprecedented boom in commercial motordom.

### Kerosene and Crude Oil

Another development is in the use of kerosene and crude oils for commercial vehicles. One of the leading French carbureter specialists has been working on this problem for a considerable time and has produced a carbureter which will not only burn kerosene with results equal to gasoline but can also be used with entire success for crude oils. Although it is not possible to publish details at the present time, the invention has got to the practical stage and is interesting the French war department. No change whatever is made in the motor when using crude oils; only the carbureter is changed. While the kerosene carbureter offers but a relative interest, the crude oil proposition is of the greatest importance for commercial vehicle work.

Unlike the conditions existing in England, very little attempt is being made by American manufacturers to put trucks into civilian service in France. Although they are both at war, the conditions in the two countries are entirely different. French motor users have had to give up more vehicles to the army than is the case in England; they have also lost more men and more trade, and in more cases than in England are unable to carry on at all.

Although touring cars can be bought, it is practically impossible to get trucks from any of the French factories, the army taking up everything that can be produced by the home factories. While there is a decided shortage of all kinds of commercial vehicles, the tendency is to adopt makeshifts rather than look to America for new vehicles. There are numerous reasons why the French truck user should prefer to wait. In some cases he is afraid of a new truck being requisitioned; owing to import duty an American truck is liable to be dearer than one of French make; with a foreign truck he is not able to take advantage of the subsidies given under the French military scheme; he may believe that after the war thousands of used trucks will be put on the market; the value of American trucks has not been brought before him in an attractive and forcible manner.

### Private Trucking Paralyzed

Passenger-carrying services, including the Paris buses, have been stopped altogether; heavy transportation is being done by horse teams and makeshift motors; department store deliveries, which are generally of a light nature, were first suspended, then effected by makeshifts, and are now returning to something like normal conditions. The type of commercial vehicle for which there is most immediate need is one carrying from ½- to 1½-ton loads. This is wanted for newspaper deliveries, the department stores, and general business purposes. As the army does not want very light vehicles, some of the home manufacturers are able to supply chassis to the department stores. Renault, for instance, is furnishing the 2-cylinder taxicab chassis for this work. It is not ideal for the purpose, but it is a good makeshift.

It is very hard to forecast the commercial vehicle situation in France after the war. A few distributors are on the spot and are doing more watching than selling. Some of the leading firms having sold trucks to the French army have made no arrangements to follow up this business. Others are laying plans whereby whoever gets these army-discharged vehicles can be sure of service.

Until the war has come to a close,

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or until the end is in sight, it will be impossible to do much commercial vehicle business in France. Even then the situation will be full of unknown factors.

There is no reason why the American firms having trucks in French army service should not follow up this business, at any rate for a few years. What is to be feared is that legislation may be of such a nature that it will hardly be worth going after this trade. France is jealous of her home industry and will do much to keep out an invader when peace has been secured. Other European countries, particularly Russia, should offer a much more satisfactory field than France.

Some curious conditions prevail in the Swiss motor industry, according to a correspondent who has just returned from that country. When the war broke out both belligerents were anxious to get the greatest number of trucks out of Switzerland. It is stated that the German government approached the Saurer company with orders for war trucks. The firm's reply was that it could not build owing to shortage of material. Arrangements were therefore made whereby the company could import

(Continued on page 49)

# American Trucks Scarce in England Just as British Chassis Are Released

## Critical British Buyers Desperate for Means of Moving Freight—War Office Well Supplied

LONDON, ENG., August 27—Importers are finding a great difficulty in getting shipments of all the vehicles they want from your side of the Atlantic. The demand from private users both here and in the colonies shows no signs of diminishing, whilst amongst small traders the ubiquitous Ford is being put on the road for delivery work as fast as they can be fitted out.

The numerous reports that are coming to hand regarding the performances of American trucks in service are of a singularly satisfactory nature. Of course, there are bound to be some exceptions, but, on the whole, they appear to be making good, both in commercial and military transport. During the past week I had occasion to visit several centers where Jeffery and Peerless trucks were at work, and I heard nothing but praise regarding them from the men in charge. Some good work is also being done with Holt Caterpillar tractors, which are a decidedly novel proposition so far as transport circles here and in France are concerned.

I have been making some investigations as to the rubber tires fitted to the American-built trucks now in service and find that these comprise such well-known products as the Goodrich, Goodyear and Firestone. Some remarkable service is being given by them despite the very arduous conditions under which the vehicles, on which they are fitted, have to operate. The first two makes of tire mentioned above have been on this market for a considerable period.

### New Invaders Arrive

Amongst the latest arrivals from New York is the Mack 2-tonner, which is to be handled by the British Mercedes Co. of London. It will be known as the Milnes-Daimler. Messrs. Whitings, Ltd., have added the Denby truck to their list of machines, which already include the Federal, Hupmobile and others. In fact, it seems to me that there must be few American trucks remaining which have not found a place in the European sun. They have a splendid opportunity to prove their worth, and that is a great deal.

Believing that it would be not only interesting but instructive, I have obtained for THE COMMERCIAL VEHICLE the views of one of the firms engaged in marketing chassis which are built in the United States. One of the leading concerns, Messrs. Gaston Williams & Wigmore, Ltd., tell me that up to the present they have been most successful in their campaign, having included amongst their customers several large breweries who have taken Packard and Peerless trucks to replace steam, and they go on to say that "naturally enough for light delivery work the Selden has made great strides. Not only has this little 2-tonner been used for delivery work, but it has also found considerable favor with seaside jobmasters for sight-seeing work, one of our clients at Bournemouth having taken no less than six."

### Making Reputations

"It would," added one of the principals of this firm, "be premature to speak convincingly as to the future, but it is our belief that by delivering American trucks of tried quality and giving willing and efficient service we may do much

Kelly truck coming through a French village recently destroyed by German shells, above, and below, one of Berlin's erstwhile motor buses overtaken by the British as they drove the Germans out of the valley of the Marne. Mr. Bradley stands to the right

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to redress the reputation of the American heavy chassis in this country.

"It must be remembered," he continued, "that prior to the war few first-class American commercial chassis had found their way across the water. Some obscure makes had been marketed by irresponsible parties, who would effect a few sales but entirely disregard their obligation as to up-keep and service, with the result that several users were placed in the undesirable position of having a truck with no means of obtaining the requisite spare parts, etc. It is our policy to maintain a stock of spare parts to take care of any trouble that may arise with any chassis we handle." Messrs. Gaston, Williams & Wigdore handle, amongst others, the Jeffery, Selden, Kelly-Springfield, Packard, Peerless and the U. S.—R. Douglas-Vickers.

LONDON, ENG., September 7, 1915—In view of the fact that my last communication to you, dated September 3, went down with the ill-fated *Hesperian* off the coast of Ireland, it is necessary for me to narrate again the incidents dealt with in it.

First and foremost was an important note from the War Department to certain British commercial vehicle manufacturers to the effect that they would be permitted to supply customer's requirements within certain specified limits. That is to say, of their entire output a certain number might be sold to users approved of by the War Department, who would still claim the balance. This concession, so far as I can gather, is at present confined to such firms as have in hand big government contracts and who have been severely handicapped for lack of adequate transport facilities, or those concerns who hold sub-contracts. The claimants will have to satisfy the War Department that they are genuinely engaged on war work in order to be allowed to buy commercial vehicles from those factories which have up to the present been exclusively engaged on behalf of the army transport.

Altogether about six concerns have received this permission, but it is believed that although anything from fifty to a hundred vehicles per week may be made available in this manner this will by no means meet the present demand. British factories have hundreds if not thousands of unfulfilled orders on their books, and certainly less than 50 per cent of these can truly be regarded as being required for government contract work. To meet the balance there is probably another half dozen firms or so, but it is extremely doubtful if their combined output would do more than partially satisfy the needs of the moment. It must also be noted that several very large commercial vehicle factories have been taken over by the Ministry of Munitions and are not in a position to produce any type of vehicle. Who, then, is to make good the shortage? From what I can see it lies very much in the hands of those importers and traders here who have secured concessions for the sale of American-built vehicles.

Wichita trucks being loaded onto steamers at Galveston, Tex., for delivery to British dealers

It now seems to be a settled conviction on the part of most thinking people that the question of efficient transport is much more important than who is to supply the vehicles. When you get goods piling up on wharves, in warehouses, and along railway sidings merely because the railways are choked and understaffed whilst motor trucks cannot be had in sufficient numbers, the nationality of the man who comes to your aid is quite a secondary affair. That is pretty much how we feel just now.

### Absorption on War Trucks

There is, however, another factor in the situation that will have to be taken into consideration. It seems that the War Department has now had all the vehicles it wants, at any rate for the present, and that the home factories will be relied upon to maintain the reserve that has been built up. Indeed, rumors are current in the trade today that all contracts with firms on your side have been cancelled. If that is so it means that a still larger supply of vehicles will become available for private users, and should the supply exceed the demand we will do doubt have a fall in prices, which have, on the whole, been very good up to the present. I have as a matter of interest taken the opportunity of asking Messrs. Peters & Sons, Ltd., who handle the Signal chassis here, what they think of the situation, and this is what they say: "We are selling as many Signal chassis from 25 cwt. to 3½ ton as it is possible to receive from the factory. At the present moment we have as many as 215 vehicles on order and are making steady deliveries weekly." I have no doubt that there are other concerns engaged in the import trade who are not quite so fortunate, but that is a commonplace of all trade.

Despite the changes and fluctuations that are apparent, fresh arrivals from New York continue to make their appearance. One of the latest is the 4,000-pound Brockway, which is being marketed by the Vulcan Car Agency, of 166 Great Portland street, London, W.

An American commercial vehicle which I understand is making good here, and particularly in Scotland, is that built by the Driggs-Seabury Ordnance Corp. It is, I believe, known with you as the Vulcan, but is here designated the D. S. O. In our military parlance that means the Distinguished Service Order. This chassis, as no doubt you are aware, bears a strong resemblance to the British-built Commer Car, which has met with great success.

A certain amount of attention has been drawn to what appears at first sight to be a discrepancy in the rating of American vehicles marketed here when compared with the rating in the States. For example, a 4,000-pound truck is often labelled on arrival here one of 6,000- or 7,000-pound capacity. This practice, for it has really become a practice, is at first sight a trifle sus-

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## Motor Delivery in Department Stores

(Continued from page 9)

side provide space for bicycles, rolls of rugs, linoleum, etc.

C. O. D. deliveries, calls for returned goods, and on-approval calls, all involve great delays, delays which are difficult to avoid, owing to the fact that they are the fault of the customer, who cannot be controlled.

### Where the Customer Errs

Much of the C. O. D. delay is due to the inability of drivers to make change. It ought to be possible for department stores to employ trustworthy men who could be sent out with a supply of change, requiring bonds, if necessary.

Delays for goods called for are due in part to the lack of proper wrapping material on the part of the customer. Many department stores of recent times have adopted the pasteboard box in preference to wrapping paper only, because it permits of faster and more secure wrapping and is more convenient in the shipping room. A regular customer soon acquires a stock of these boxes, which are convenient in wrapping goods to be returned.

Goods sent on approval will probably be kept in the original wrapping, if it is a box, while a paper wrapping would be destroyed or taken to another part of the house.

### Better Wrapping Pays

Breakables are being delivered by some stores in fiber and corrugated strawboard containers, which the deliveryman returns to the store when the delivery is made. Having a supply of these in his truck at all times, the driver is able to save time in collecting like goods which otherwise would tax his ingenuity to wrap safely on the customer's premises.

Poor wrappings are also complained of as cause for delay both in sorting and delivering packages. Pasteboard boxes and fiber containers are remedies alike for this and the last-mentioned difficulties.

Some complaints are made that customers mislead clerks as to their location so as to get them to promise early delivery, while others state that the clerks volunteer impossible deliveries.

## His Fellow Feeling Solved Driver Problem

(Continued from page 33)

Each driver must make a report nightly at the garage as to the condition of his vehicle and note anything, which in his opinion, should be attended to. Kummer gets these reports the following morning before the trucks are loaded at the store. He goes over each vehicle thoroughly to see if the necessary repairs have been made. He also judges the care which the driver has given his car by the amount and the kind of repairs made from time to time. In this way he is able to keep a close watch on the vehicles at all times and to judge of the work being done by the driver by his knowledge of the packages handled and the time taken to deliver them.

Even with this system of checking up the drivers and the rising scale of wages, Kummer has found that the drivers need watching in order to have them give their best efforts to the company. This watching consists of untiling personal supervision and draise distributed where praise is due and censure in its place.

Kummer has eliminated much of the idle time due to pneumatic tire blowouts on his gasoline trucks by teaching all of the drivers how to repair them and by supplying an extra tire on each vehicle. The electrics, which are all solid tired, have no delays due to tire changing, because a stock of wheels already tired is kept at the garage at all times and when a new tire is necessary an entire new wheel and tire are fitted at night.

## Trucks Help Galveston Rehabilitate

The Second Galveston Flood was not so [illegible] as the one made famous by panorama shows [illegible] it caused a disastrous paralysis of the city's business. Without newspapers, a city is indeed in a bad way. Without the means of writing letters [illegible] is hard to secure.

Motor trucks came to the rescue both to the [illegible] and the waiting letter writers. To the left is shown a Wichita 2-tonner with its [illegible] jacked up and a belt over its tires to [illegible] the plant of the Galveston Tribune until the [illegible] power plant could be [illegible]. The [illegible] below shows an attendant replenishing the supply of radiator water to prevent overheating.

To the right below, is shown a G. M. C. [illegible] loaded with Remington typewriters. Many typewriters were destroyed by the floods and [illegible] a few days the business boomed so that [illegible] trucks had to be hired to deliver the [illegible] machines to the multiplied office buildings.

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# Truck Conquers Pike's Peak

Photos by Spooner & Wells

**Ten miles an hour up grade on a 1½-mile stretch of the Pike's Peak Highway. Smooth as a billiard table and 20 feet wide, but sharply inclined**

**By F. Ed. Spooner**

WHEN in 1806 Colonel Zebulon Montgomery Pike and some United States soldiers discovered Pike's Peak the colonel said that no human being would scale its heights. Colonel Pike made this statement after he had tried himself to get to the top. A little more than 100 years later Pike's Peak may be reached by as perfect a motor road as was ever built. The road is perfect, the scenery magnificent and the climbing difficult, as may be realized from the fact that the average grade is slightly above 10 per cent with many grades that will easily reach 25 per cent to 30 per cent. The roadway twists and turns from the start and many of the most difficult grades are right at the turns. These turns are of the hairpin, the letter W and of every other imaginable shape and lend variety to the difficult feat of reaching the top.

The opening of Pike's Peak Highway, the world's highest highway, was an event of the utmost importance to the people of Colorado Springs and of Colorado. The highway starts at Cascade, which is about 12 miles from Colorado Springs. The Pike's Peak Ocean to Ocean Highway passes right by the toll gate through which tourists must pass to climb the heights, and it is believed that the very fact that the peak may be climbed will add greatly to the importance of the Ocean to Ocean highway and result in much added touring by that route. The rivalry between the Lincoln Highway and the Pike's Peak Ocean to Ocean Highway is intense and each is a popular route to the west and from the west to the east with over 500 touring parties daily passing along the Ocean to Ocean route at the present time. This number will increase greatly with the opportunity to make the climb up Pike's Peak.

**Taking a ton up one of the grades at 7-mile**

About a score of touring cars and one motor truck, the Wilson, manufactured by J. C. Wilson Co., of Detroit, participated in the opening. Over 300 people reached Glen Cove, the highest point attainable at this time. The Cove is about 12,000 feet up and beyond this point the road is now being worked above the timber line the climb to the top was found to be out of the question at present, although the Wilson made valiant efforts to go higher up and did reach a point very much above the Glen Cove stop. Great masses of rocks in the roadway and sides of the mountain torn away by the blasts prevented the 2-ton Wilson from going farther than it did and horse-drawn vehicles lightly loaded found it impossible also. The work will be pushed this year until snow prevents farther work, and it is believed that ere snow encompasses the peak more than it has done to the present time, most of the preliminary work will have been accomplished, after which the work will have to rest until next spring. Already it has been necessary to dig through 10 feet of snow at times to work at all. Warm weather during September and a part of October is expected, in which event it may be possible to carry the work through to completion, making the road passable.

When the J. C. Wilson company sent one of its 2-ton models out to Denver for a demonstration the Pike's Peak Highway Co. asked that a trip be made to Colorado Springs for an early attempt to scale the heights with a load. George Doelle, the driver, communicated with the factory and on securing permission from Stanley Wilson, secretary of the company, made the trip from Denver to the Springs at a time when the roads were practically impassible. On reaching Colorado Springs Friday, August 27, he loaded supplies

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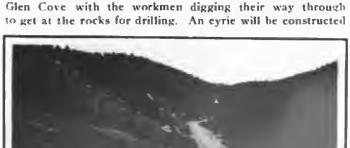
tor Glen Cove and started. The first trip of practically 12 miles to an altitude of over 12,000 feet was made in 3 hours 50 minutes and 10 gallons of gasoline were consumed. The down trip was made in 1 hour 45 minutes. On the following day, after some changes in the carbureter, Doelle took up a load in 3 hours even and used only 4 gallons of gasoline. The down trip was made in 45 minutes. No ascent was made Sunday and Monday, but on Tuesday, with a load of 1 ton for the barbecue, the journey to the Cove was made in 2 hours 20 minutes and 5 gallons of gasoline were used. The journey down took 1 hour. The trip on the day of the opening and at the head of the procession took 1 hour and 50 minutes.

There have been five stages in the methods of reaching Pike's Peak, on whose snow-tipped summit more people have stood than on any other mountain top in America. First came the Indian, ascending the grand old peak by a series of trails, the origin of which has never been learned. Then came the prospector and his burro and the ever hopeful but often hopeless search for gold in the rocky recesses. Following this, in 1888 the wagon road was constructed to the summit when men thought that gold was in the granite of the crags. Steam next furnished the motive power, and the cog road was constructed to carry its hundreds of thousands of sightseers to the summit. It was in 1888 that General William T. Sherman declared that the wagon road up the steep slopes was the most wonderful feat of mountain road building that had ever been seen.

The entrance to the highway is at Cascade through an ornamental gate. A broad, firm winding roadway is found, constructed of decomposed granite for many miles. Every foot of the ascent is crowded with scenic interest. Midst a wealth of wild flowers the Wilson passed through groves of cottonwoods and quaking aspens, birches, pines and scrub oak. Every turn in the road brought new wonders. At Observation Point the motorists look out over a vast area of scenery stretching far below and to the north and west. Down below is seen the ribbon-like, winding road, with its hairpin and W bends. Traced in white against the green and mottled gray the road is seen for miles. Higher and higher the road climbs from an elevation of 7,415 feet. The highway is not completed for travel to the top as yet, but the cannonading of dynamite tearing away granite slabs and boulders tells of the work going on above. The company believes that the entire road will be completed by October 1. It is now open to traffic to Glen Cove, which is about 12,000 feet. At this point will be located a hostelry, where tourists may stop when making the ascent and from which point guides are to be provided owing to the dangers of the ascent from this point due to sudden changes in the atmosphere. Snow storms come up suddenly, the clouds come down low, and the first trip made by the Wilson found 10 feet of snow above Glen Cove with the workmen digging their way through to get at the rocks for drilling. An eyrie will be constructed



How the road winds up the canyon to 4-mile

Above Glen Cove on the timber line, beyond the road. The road will continue up the side of the crags in the background

on the top, but none will be allowed to stop there, partially on account of the dangers of the extreme altitude of over 14,000 feet and the dangers of blinding storms and clouds, making ascent impossible.

When those who attended the opening reached Glen Cove they turned off down a hill into a deep valley, through which the motor truck successfully traveled, carrying the barbecue material, on Tuesday. The grade down was over 25 per cent and at the bottom at the side of a spring the guests were received and fed barbecue style. Following the lunch a number of addresses were made. Mayor Charles McKesson was the main speaker in the absence of United States Senator Charles S. Thomas, who was compelled to remain in Denver owing to illness.

The road is costing $400,000. Several stretches of the highway cost more than $20,000 per mile. This indicates the vast difficulties encountered in the road's construction. Eugene A. Sunderlin, Charles E. Noble and William A. Otis have played a prominent part in the building and financing of the road. Others interested are Spencer Penrose, Charles M. McNeill, A. E. Carlton and F. M. P. Taylor. M. L. Drew is traffic manager.

The complete highway is 17 miles long. It has been constructed along railroad specifications. It is 20 feet wide on the straightaway and 26 feet at the curves. This provides a double track the entire way. The average curvature is 40 degrees and a maximum is in a few places only of 96 degrees. The average grade is about 10 per cent, while the maximum is about 25 per cent. The grades all rise from Cascade except in two instances. The bridges are of steel and concrete of the ballasted type. They are located on tangents and can be seen 300 feet away. Box culverts are of solid reinforced concrete and smaller drains are of corrugated iron. The surface of the road is a parabolic curve, being 4 inches higher on the outer edge on tangents and 1¾ feet on the curves. A surface ditch following the inside of the road carries the drain water to the culverts. Gasoline stations have been arranged along the route and there are two windmill pumps for water, and other stations are supplied by the streams.

At the conclusion of the trip from Denver to Colorado Springs, over roads washed out at the time and pronounced impassable, and after four ascents of Pike's Peak to the highest point possible to attain, George Doelle, driver of the Wilson 2-ton worm-driven truck of the J. C. Wilson Co., of Detroit, felt so well satisfied with his work that he drove back to Denver and thence wired the factory in Detroit, asking permission to return to Detroit over the road, a distance of about 1,250 miles. Having secured this permission, Doelle started with the intention of selecting the

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GLIMPSES OF THE PIKE'S PEAK ROAD

Upper left, monument to Col. Pike on the grounds of Hotel Antlers, Colorado Springs. Upper right, the mountains above the timber line, showing traces of snow. Lower right, sign set by Wilson truck at intersection of Pike's Peak-Ocean-to-Ocean Highway and the Pike's Peak road. Lower left, rounding a turn at 8-mile, leading into soft going

best possible route as he went along. The journey will cover approximately 1,250 miles.

The Wilson was the only truck to attempt to make the ascent and on no one of the four trips did it give the slightest trouble, excepting only the dropping of a fan belt, and the car was driven 9 miles without a fan and without overheating. No nut or bolt was tightened in the four journeys which took the truck to and past the timber line, over 12,000 feet above sea level.

At the conclusion of the third trip Doelle was asked to deliver his 2 tons at a distance of ½ mile from the regulation route down a precipitous route through ditches and over rocks with a grade at times of 25 per cent. Wagers were made that he would not be able to get out of the cove, but the Wilson walked out and was at no time in distress.

## A Philippino Jitney for Natives and Chinese

Driven by a Philippino, with a Chinaman for a conductor, the B. A. Gramm 1-ton truck shown in the accompanying illustration is owned by an American in Zamboanga, P. I., and used as a bus for natives and Chinese on a 20-mile route through the surrounding towns. Unlike the elaborate checking systems in use on American street cars and motor bus lines to prevent theft of fares, no such system is necessary on this bus, the antipathy between the two races insuring correct returns and eliminating any attempts to split the proceeds.

The bus body consists of a wood top supported on eight stantions with four crosswise seats, each accommodating five passengers. Side curtains are used to protect the patrons of the line in inclement weather.

Although the American owner, Patrick H. Frank, has found that the strange combination of native driver and Chinese conductor has proven very efficient, he keeps in touch with the vehicle at regular intervals along its winding route in the hills and lowlands of out Pacific island possessions. This he does by means of a field telephone which is shown to the driver's left in the accompanying illustration. The truck driver uses this instrument for reporting the progress of his trips or to call for assistance in case the vehicle becomes mired or is otherwise held up.

A Philippine jitney

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## FIFTH AVENUE'S U. S. BUSES

### New York Bus Line Testing Three Makes of American Bus Chassis

To the Editor, COMMERCIAL VEHICLE: Kindly inform me as to the experience which the Fifth Avenue Coach Co. of New York has had with American bus chassis. I understand that while this concern has been running buses for a number of years, it still clings to European chassis and only recently has permitted American manufacturers to demonstrate their wares.—Jitney, Chicago.

While the Fifth Avenue Coach Co. has steadfastly clung to the original DeDion chassis with which it started, it has from time to time constructed experimental chassis and has tried out special designs from this country. Nevertheless, your understanding is correct in that the three American chassis now in use by the line are the first stock American chassis tried out by the Fifth Avenue company.

They are a Packard, a White and a Chase. The officials of the company are still reticent, but interesting developments are expected in the future.

The European makes employed are the DeDion and the British Daimler.

## COMPLETE SPRINKLING TRUCK WANTED

### Special Job—No Such Vehicles Kept in Stock, But Any Can Build

To the Editor, COMMERCIAL VEHICLE: I would appreciate it very much if you would advise me the names of manufacturers who build sprinkling trucks complete with intake and pressure pump.—J. B. Crockett, New York City.

The demand for street sprinklers is not of sufficient volume to warrant truck makers in stocking special sprinkling models, so that each order is more or less of a special job. A number of manufacturers, however, have built trucks of this description and are no doubt prepared to fill orders quickly. A few of these are given below, but it must be understood that this is not a list of truck builders who have constructed sprinkling vehicles, for such a list would consume too much space.

Federal Motor Truck Co., Detroit, Mich.
Four Wheel Drive Auto Co., Clintonville, Wis.
General Vehicle Co., Long Island City, N. Y.
Gramm-Bernstein Co., Lima, O.
International Motor Co., New York City.
Kissel Motor Car Co., Hartford, Wis.
Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Tiffin Wagon Co., Tiffin, O.
White Co., Cleveland, O.

## The Readers' Forum

All readers of THE COMMERCIAL VEHICLE are invited to avail themselves of the service of The Readers' Forum, whether subscribers or not. The editors of this department will furnish information on any subject relating to the construction or operation of commercial motor vehicles. Communications from readers on pertinent topics are solicited. No attention is paid to unsigned letters, although if the reader desires, he may designate a *nom de plume* for publication. There is no charge. Inquiries answered by mail if request to that effect is made.

## WANTS A NEW TRUCK NAME

### Fidelity and Eclipse Are New to Truck Industry

To the Editor, COMMERCIAL VEHICLE: Appended hereto are seven names, regarding which I should like to have some information. I am trying to find a name for a new motor truck proposition. Please tell me which of them has been used previously as applying to a motor truck; who used them, when and where, which, if any of them is now in use; and what has become of the company that formerly used such as these, if not now used.—Vox Populi, New York City.

The names are, Superior, Victor, Monitor, Fidelity, Atlas, Mercury and Eclipse.

All of these have been used before with the exception of Fidelity and Eclipse. The latter is used by a parts concern, however, which gives the preference to Fidelity.

The Superior motor truck was manufactured by the F. G. Clark Co., Lansing, Mich., and another of the same name was built by the Superior Motor Truck Co., Superior, Wis. Both concerns are out of business.

The Victor Truck was built by the Victor Auto Mfg. Co., St. Louis, Mich., now out of business.

The Monitor is now made by the Monitor Automobile Wks., Janesville, Wis.

Atlas vehicles were made by the Atlas Automobile Co., Springfield, Mass., several years ago.

Mercury trucks and tractors are now made by the Mercury Mfg. Co., Chicago.

The motor truck industry is unfortunate in having a number of makes with identical names, while revived names are always confusing to the public.

## ANCO ABANDONED NEST BODY

### Removable Superstructures Not Needed In Wholesale Grocery Delivery

To the Editor, COMMERCIAL VEHICLE: It occurs to me from a perusal of your article regarding the transportation scheme of Austin, Nichols & Co. that here is an excellent opportunity to use the nest body a thing, by the way, which seems to have been overlooked by the Anco people. What says THE COMMERCIAL VEHICLE?—Horatio Willert, Buffalo.

Removable bodies have been considered by the Austin-Nichols company, but abandoned as unnecessary in its business owing to the fact that the loads are nearly always delivered piecemeal, so that the only time the nest could be brought into play would be in loading, which is expeditiously cared for by the admirable internal system that little if any time could be saved to justify the additional expense and complication.

## AMERICAN TRUCKS IN ENGLAND

### Thirty-four of Our Makes For Sale in Great Britain

To the Editor, COMMERCIAL VEHICLE: Can you give me a list of American trucks made here and sold in England? If so, please arrange them according to the familiar American name and then give the English name after.—Richard M. Mead, New Rochelle, N. Y.

As far as is known there are thirty-four American truck makes actively on the English market. They are:

| American name | British name |
|---|---|
| Autocar | Autocar |
| B. A. Gramm | Garner |
| Baker electric | Baker |
| Bessemer | Bessemer |
| Brockway | Brockway |
| Buick | Buick |
| Burford | Burford |
| Chase | Chase |
| Columbia | Shakespeare |
| Denby | Whiting-Denby |
| Federal | Whiting-Federal |
| Four Wheel Drive | F. W. D. |
| G. M. C. | G. M. C. |
| G. M. C. electric | Edison |
| G. V. | G. V. |
| Holt caterpillar | Holt caterpillar |
| Jeffery | Jeffery |
| Knox | Knox |
| Little Giant | C. P. T. |
| Locomobile | Locomobile |
| Maccar | Romar |
| Mack | Milnes-Daimler |
| Packard | Packard |
| Peerless | Peerless |
| Pierce-Arrow | Pierce-Arrow |
| Schacht | Patricia |
| Selden | Selden |
| Signal | Signal |
| Standard | Seabrook |
| Stegeman | Parker |
| Vulcan | H. S. O. |
| White | White |
| Wichita | Wichita |

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# Commercial Vehicles

## Detroit Package Vehicle, $690

ONE CHASSIS model of 1,000 pounds capacity is made by the new Detroit Commercial Car Co., Detroit, this model being provided with three standard bodies and sold only complete with the body. The vehicle is a conventional design with a unit power plant under a neat hood and final drive by spiral bevel gears. It is interesting in its rear springing, which is of the full cantilever type, and which is relied upon for propulsion. It is electric started and lighted.

Details of the chassis follow:

| | |
|---|---|
| Capacity | ½ ton |
| Price with body | $690 |
| Wheelbase | 106 inches |
| Tires, front | 30 x 3½ |
| rear | 30 x 3½ |
| Drive | Bevel |

The unit power plant is suspended from three points directly on the mainframe, in unit with the clutch and gearset, and drives through two universals to the floating-type spiral-bevel-driven rear axle.

The motor details follow:

| | |
|---|---|
| Bore | 3¼ inches |
| Stroke | 4 inches |
| S. A. E. horsepower | 16.92 |

It is block cast with the valves on the left, under pressed steel cover-plates. Water circulation is induced by thermosyphoning through the square-tube radiator. A Zenith carbureter is fed by gravity from the tank beneath the seat, and is provided with a hot-air fitting. There is no governor, as the vehicle is mounted on pneumatic tires and built for fast work.

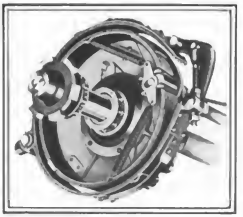

Fig. 1—Brakes and axle spindle of Detroit package vehicle—note the Bower roller bearings and the driving splines of the floating axle

A single-unit electric starting and lighting system, chain-driven from the flywheel housing, provides current for the Connecticut single ignition system in connection with a storage battery.

A dry-disk clutch and selective three-speed gearset are mounted as a unit with the motor, control levers and pedal brackets, final drive being by a shaft with two universals to the rear axle. The torsion member is an A-shaped arm parallel with the shaft.

Brakes are internal and external on the same drums, of exceptional size for this weight of vehicle—12 by 2 inches. The steering wheel is to the left and carries no levers, the spark being fixed and the throttle being foot controlled.

Besides a standard canopy-top express and a full panel body, the Detroit vehicle is supplied with what is called the De Luxe panel, for $745. This body is of heavier build than the standard panel type and is provided with easy curves instead of straight lines. Both panel bodies have cowl dashes and the open type a plain dash. The vehicle is fitted with well-moulded fenders and closed pressed-steel running boards.

All models have rain-vision windshields, Stewart speedometers and one extra demountable rim.

## Wichita Worm-driven Models

RESPONDING to the demand for inclosed-driven trucks, the Wichita Falls Motor Co., Wichita Falls, Tex., has produced a full line of worm-driven models as an alternative to its chain-driven line. While it is understood that the chain-driven vehicles will not be dropped, the greater demand will un-

Fig. 2—Detroit package vehicle, showing the complete panel-bodied car, two views of the motor and the stripped chassis. Note combination intake and exhaust manifold and starter application to motor and cantilever springs on chassis view

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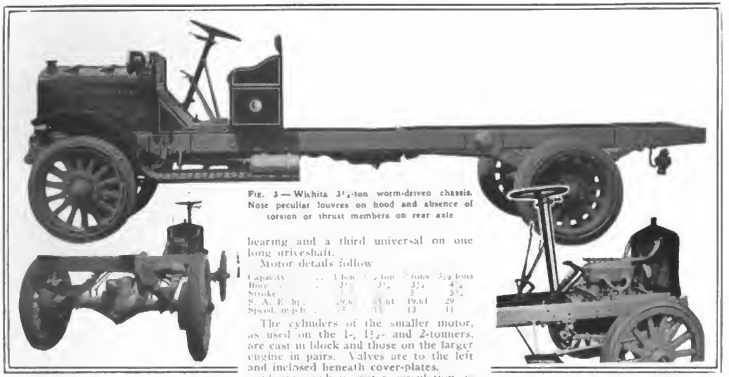

Fig. 3—Wichita 3½-ton worm-driven chassis. Note peculiar louvres on hood and absence of torsion or thrust members on rear axle

Fig. 4—Rear end of 1½-ton Wichita. Note simplicity

Fig. 5—Motor of 1½-tonner. Note Y-branched water hose

questionably be for the shaft-driven models.

Four sizes of the new series are offered, all of which follow standard European type lines with Sheldon axles and springs and Hotchkiss drive. Their features follow:

| | | | | |
|---|---|---|---|---|
| Capacity | 1 ton | 1½ ton | 2 ton | 3½ tons |
| Price, chassis | $1,650 | $1,800 | $2,100 | $3,250 |
| Wheelbase | 118* | 118* | 118* | 165 |
| Tires, front | 36x3 | 36x3 | 36x3½ | 36x5 |
| rear | 36x4 | 36x5 | 36x6 | 36x5d |
| Drive | worm | worm | worm | worm |

*144-inch wheelbase extra.

Motors are all located under conventional hoods with gable tops and louvres. On all but the largest size they are suspended direct from the frame, the larger employing a subframe. The motor and clutch is located separate from the gearbox on all models, the latter being located amidships in order to decrease the free length of shafting, this method being considered a better alternative than having a middle bearing and a third universal on one long driveshaft.

Motor details follow

| | | | | |
|---|---|---|---|---|
| Capacity | 1 ton | 1½ ton | 2 tons | 3½ tons |
| Bore | 3½ | 3¾ | 3½ | 4¼ |
| Stroke | [illegible] | [illegible] | 5 | 5¼ |
| S. A. E. hp. | 29.6 | 33.61 | 19.61 | 29 |
| Speed, m.p.h. | 15 | 15 | 13 | 11 |

The cylinders of the smaller motor, as used on the 1-, 1½- and 2-tonners, are cast in block and those on the larger engine in pairs. Valves are to the left and inclosed beneath cover-plates.

Thermo-syphon water circulation is employed on the three smaller models, but a centrifugal pump is used for the big fellow, the radiators used being of the cellular type with a Y-shaped pair of hose connections from the motor to the tank at the top. The radiators are suspended on trunnions to avoid strain from frame distortion.

Ignition is taken from a high-tension magneto on the single plan, and circulating-splash lubrication is provided.

Leather-faced cone clutches are used on all models, springs beneath the leather providing easy engagement. Drive thence is by a shaft to the gearset amidships, on each model. Gearsets are of the three-speed selective type and drive by tubular shafts to the Sheldon worm-driven rear axles through two universals. Two universals are used also between the clutch and gearset of each model.

The axles are not provided with either radius rods or torque members, the springs being relied upon to take both torque and thrust. All springs are perched above the axles and provided with sliding friction plates on their rear ends in lieu of shackles, the friction plates acting somewhat as shock absorbers due to the friction. Brakes are both internal, the shoes being side by side on the same drums.

Pressed steel frames of rigid build are used and the spring hangers are hung outside the frame. Control is on the right side with central levers, this construction being employed because the chassis are intended both for domestic and foreign sale. Spark and throttle levers are mounted beneath the steering wheel

Wheels are of wood with square spokes and carry pressed-on solid tires. It will be noted in the tire specifications above that single tires are used on all models but the largest, which uses duals in the rear.

Fig. 6—Three views of the Electruck. Above, equipped with the center-drive milk body for which it was designed. Left, front view showing elliptic springs and motor suspension. Right, rear view showing underneath worm drive and platform springs

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## The Electruck

CARRYING its load of milk bottles both fore and aft of the driver in standard trays, the Electruck, made in Los Angeles, employs the body design which permits the driver to sit in the middle and reach the whole load from the driving position.

The Electruck is a specially-designed vehicle for the Los Angeles Creamery Co., built in its own machine works. Two of the trucks have been built and operated by the company since May, 1914. They were built to test the opinion of President Geo. E. Platt, of the creamery company, that electric vehicles could be operated more cheaply than horse wagons in milk delivery. As no machines were on the market having the center drive feature, and the company has a well equipped motor shop, it decided to build its own, with a view to producing a truck that would supply its own needs, and possibly find a wider market. Timed tests have shown that a driver gets away from the machine with his milk in one-third the time required for handling milk from a vehicle unloading from the rear end.

The truck has a frame made by Parish & Bingham, Cleveland, Timken axles and underrunning worm drive, G. E. 10-26, 1,200 r. p. m. motor, 85 volts, 28 amp., 2.3 h. p. rating, and G. E. 4-speed controller. There is no secondary reduction between motor and worm gear. Control is entirely from the wheel, the controller being located under the floor in the center of the car, and reached by removing the floor boards, the controller being in a waterproof box.

The capacity of the vehicle is 1,500 pounds. The battery is 42 cells 11 plate M. V. Ironclad Exide. Lights and horn are controlled from a small box on the steering post which contains fuses and switches. The two brakes are fitted with floating equalizers, that is, the bars are hung from rods not fitted to the chassis, with springs to hold them up and destroy any tendency to rattle.

The wheelbase is 90 inches, tread 56 inches, height of platform 30 inches above ground, with a step, and step fitting on the battery box. The vehicle runs easily in alleys on account of its narrow tread and turns in a circle of 32 feet.

Springs are of the platform type in the rear, front three-quarter elliptic. Tires, 36 by 3½ solid all around. Speed, 13 miles per hour, mileage 50 miles continuous running. The truck and its body weigh 4,000 pounds including the battery.

The Electruck was designed by A. W. Harrison, electrical engineer, Los Angeles Creamery Co., and built in its shops under supervision of Eustace B. Moore, superintendent.

Ten additional trucks to be built in the near future will have a number of refinements and improvements in design.

## New G. V. Gas-electric Tractor

DESIGNED to do all the trucking in the model street cleaning district of New York City, the new G. V. 10-ton tractor made by the General Vehicle Co., Long Island City, N. Y., and announced in the September 1, 1915, issue of THE COMMERCIAL VEHICLE, has gas-electric drive. One of the special features of the unit is the use of a solenoid device connected with the butterfly valve of the gas engine carburetor and the electric circuit which acts so that the engine speed is automatically cut in half when there is no load on the generator.

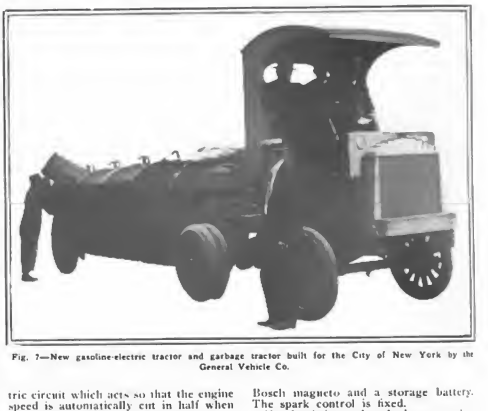

Fig. 7—New gasoline-electric tractor and garbage tractor built for the City of New York by the General Vehicle Co.

The tractor is to be run 10 hours a day, the first 8 in the house-to-house collection of garbage, ashes and rubbish, and the other 8 in street washing. This is to be accomplished by the use of two separate semi-trailers. It is also proposed to use it for snow sweeping and also for snow removal with a bottom-dump trailer. While the conventional electric truck would have been sufficient for the garbage collection alone, its battery would have been insufficient for the 16-hour stretch when hauling the semi-trailers and for this reason the gas-electric type of drive was decided upon.

The details of the chassis are as follows:

| | |
|---|---|
| Capacity | 10 tons |
| Price | $5,000 |
| Wheelbase, inches | 72 |
| Tires, front | 36 x 5 |
| rear | 36 x 5 dual |
| Drive | Internal-gear |

The motor is mounted under the floor of the cab and is directly connected to an electric generator at its rear end. The current generated is then carried to two motors, supported beneath the frame, aft of the rear axle. These drive through a countershaft with spur gears to internal gears mounted on the rear truck wheels.

The motor is a four-cylinder Wankesha, as follows:

| | |
|---|---|
| Bore | 4½ |
| Stroke | 6½ |
| S. A. E. horsepower | 36.15 |
| Speed, m. p. h. | 8 |
| Speed, r. p. m. | 900 |

The cylinders are cast in pairs with the valves in the head at the left. Cooling is effected by a centrifugal pump and a Rome-Turney cast-case radiator. The carbureter is a 1½-inch Zenith, model L-o, with a special G. V. solenoid device operating at the butterfly valve in such manner that the speed of the motor is automatically reduced to half its normal speed when idling. This device is sealed and is not under the control of the driver. The governor is of the centrifugal type, driven from the motor. Ignition is on the dual plan, using a Bosch magneto and a storage battery. The spark control is fixed.

No clutch is employed, the motor being started at the beginning of the day's work and kept running, its speed being regulated by the solenoid device. No gearset is employed, the change in speed being regulated by an electric controller in the driver's cab which permits of five forward and two reverse speeds. The total gear ratio is 20 to 1 in all speeds.

The current from the generator is carried first to the controller and thence along the frame to each of the driving motors. These are inclosed in cases integral with the radius arms and which also carry the countershafts by means of which the drive is taken from the inboard end of each motor to the internal gear on each wheel. Propulsion is through the springs.

The springs are semi-elliptic all around, underslung at the rear. The frame is of channel section. Both sets of brakes are operated by the foot, one set being on the rear wheels and the other on the countershaft. All are of the internal-expanding type. Hand-operated locomotive type brakes on the trailer wheels are controlled by a lever on the right of the driver's cab.

The electric controller is mounted on the right in the cab, below the seat. The steering column is also located on the right.

The General Vehicle company manufactures only the tractor, the semi-trailers being built by Charles Hvass on order. The connection for the semi-trailer consists of a Shadbolt fifth-wheel mounted 3 inches forward of the centerline of the rear axle.

## New Standard 20-tonner

BUILT for only the heaviest hauling at speeds not in excess of from 8 to 10 miles per hour, the new Standard 20-ton four-wheeled tractor, made by the Standard Tractor Co., New York City, and originally announced in the February 1, 1915, issue of THE COMMERCIAL VEHICLE, differs mainly from the 10-ton unit announced in the same issue, only in the size of the load-sustaining parts. The

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20-ton unit, like the 10-tonner, is characterized by its method of drive which consists of a worm-driven jackshaft placed aft of the rear wheels instead of forward, thus permitting the rear wheels to be placed very close to the front ones. The short wheelbase thus secured enables the tractor to be turned in approximately 27 feet without reversing, or in 18 feet by backing once.

Other changes made in the 20-tonner as compared with the 10-ton unit besides the larger size of load-supporting and driving parts include the use of an extra-heavy, constant-mesh, individual-clutch type of gearset instead of a selective unit; the placing of the foot brake on the driveshaft instead of the jackshaft and the use of compressed-air brakes on the trailer wheels and a compressed-air motor starter.

The Standard line now consists of four models, A, B, C and D, the latter being the 20-ton unit. The four models are divided into two classes, chain-driven, low-speed commercial and a worm-driven high-speed municipal, which may also be adapted to commercial service with light trailers or with an extended wheelbase for trucking. The chain-driven models, A, B, and the new D, are of 6, 10 and 20 tons capacity, respectively.

The latest model, while rated at 20 tons capacity, is capable of drawing larger loads on secondary independent trailers, the rating applying only to the semi-trailer whose forward end rests on the tractor.

The new model outlines as follows:

| | |
|---|---|
| Capacity | 20 tons |
| Price, chassis | $4,000 |
| Wheelbase | 76 inches |
| Tires, front | 36 x 5 |
| rear | 40 x 6 dual |
| Final drive | Double chain |

The details of the four-cylinder Wankesha motor used are as follows:

| | |
|---|---|
| Bore | 4¼ |
| Stroke | 6½ |
| S. A. E. horsepower | 36.15 |
| Speed, m. p. h. | 8* |
| Speed, r. p. m. | 1,000 |

*A larger jackshaft sprocket may be supplied where a greater speed than 6 miles per hour is required which will give a speed of 10 miles per hour at the same motor speed.

The motor is mounted on a sub-frame suspended at three points. It is located under a louvred hood between the seats of the cab whose roman-front metal dash is flush with the square radiator. The cylinders are cast in pairs with the valves in the head at the left. Circulating splash lubrication is employed. Cooling is effected by a centrifugal pump and cellular radiator mounted on springs and protected in the front by the pressed steel channel frame which is bent around and joined at the centerline.

The carbureter is a Holley, fed by gravity from a 20-gallon cylindrical fuel tank carried crosswise of the frame beneath the driver's seat. The governor is of the centrifugal type, of Wankesha manufacture, and is driven from the motor.

Ignition is on the dual plan, using a Bosch DU4 magneto and dry cells. The clutch is of the dry-multiple-disk type. From thence the drive is taken through a universal joint to the Cotta, three-speed individual-clutch gearset amidships. From the gearset, the drive is taken through two universals to the Timken-David Brown worm-driven jackshaft aft of the rear wheels and finally to the rear wheels by double chains. The radius rods for propulsion extend back of the axle to the jackshaft.

The frame is of pressed steel, channel section, and made in but two pieces, the front and rear ends being bent around on a short radius and joined on the centerline. The frame is of 5/16-inch stock with a 7-inch web and 2-inch flanges. The springs are semi-elliptic, both front and rear, the latter being underslung.

Fig. 8—Three views of the new 20-ton Standard tractor, revealing between-seats motor location, expansive radiator, short wheelbase and reversed jackshaft, worm driven

Hand brakes are located in the rear wheel drums and the foot brake on the driveshaft just aft of the gearset.

Right steer and right control are used, the position of the driver permitting him to watch the edge of the road in turning.

The air brakes for the trailer wheels are of the locomotive type and are operated by the driver by means of a control on the steering column. The air is furnished by a small compressor mounted on the front end of the motor shaft, outside of the frame. This supplies air up to 150 pounds pressure to a cylindrical tank hung beneath the frame just forward of the gearset. A flexible hose is used between the tank and the brake mechanism on the trailer. The air compressor is mounted in a unit with a small air rotor which uses air from the tank for starting the motor.

The cab and the driver's seat are made of sheet metal with the floorboards of aluminum.

The connection for the semi-trailer consists of a Shadbolt fifth wheel which is mounted on the centerline of the rear axle. Approximately 40 per cent of the semi-trailer load is carried on the rear wheels of the tractor.

## Mars Crowns Alcohol

(Continued from page 39)

the raw material for vehicle construction and even gasoline, from Germany. These supplies were delivered unconditionally, but once received the firm found scores of reasons for not being able to to deliver more than two or three trucks a month to Germany while regular deliveries were made to the Allies. This correspondent declares that the Swiss Saurer factory for a considerable time possessed but four magnetos, which were used on the different chassis for test purposes and taken off when deliveries were made. The Saurer company has an important factory near Paris and an assembly shop in Germany.

## Our London Letter

(Continued from page 40)

picious to the mind of the average buyer, but I take it that it is due entirely to the difference in working conditions found on both sides of the Atlantic. Our excellent roads require less power probably than is the case with you, but I think that in some cases the chassis frames are scarcely up to the higher load rating.—R. Douglas-Vickers.

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# Men and Makers

**PACKARD MOTOR CAR CO.,** Detroit, has recently completed the construction of a new truck erecting shop, 240 by 240 feet, built of steel, concrete and glass. So badly was the addition needed that 100 trucks were run onto a part of the finished floor to receive their final adjustments before the cement mixers had vacated the premises and before the floor was completed. Carpenters and electricians were still at work and as fast as new sections of floor were finished, even before they dried, trucks were run onto them to make use of every inch of available space.

**Kissel Motor Car Co.** has broken ground for the first of a number of additions to its Hartford, Wis., plant, which George A. Kissel says will permit the output to be doubled. One of the new buildings is for storage and shipping, one for the enameling department and a third, soon to be started, is a four-story office building. The first will be 100 by 35 feet and the second 110 by 35 feet. The office building will house all clerical departments, executive offices and the drafting room.

**Stewart Motor Corp.,** Buffalo, N. Y., has opened a salesroom at its plant to display Stewart delivery trucks and passenger cars.

**Sterling Motor Truck Co.,** Milwaukee, Wis., has issued a gigantic folder descriptive of its Sternberg heavy chain-driven trucks. This folder, being descriptive of some of the largest trucks made in America, is very properly of great size. When unfolded it makes a wall-chart measuring 42 by 28 inches. It is printed in red and black.

**W. F. Jolley** has resigned as sales manager of the Troy Wagon Wks. Co., Troy, O. No future plans have been announced.

**James Joyce,** for 2½ years eastern manager for the Kelly-Springfield Motor Truck Co., Springfield, O., has resigned to become eastern manager for the Houk Mfg. Co., Buffalo, N. Y. Mr. Joyce's resignation takes effect October 1, 1915.

**W. J. Foss,** for the last 10 years treasurer of the Foss-Hughes Co., Pierce-Arrow agents in Philadelphia, Washington, Baltimore, Wilmington, Providence and Newport, has been made commercial manager of the Pierce-Arrow Motor Car Co., Buffalo, N. Y.

**Edwin B. Jackson,** president of the Packard Motor Car Co., of New York, New York distributor of Packard vehicles, has been elected to the board of directors of the Automobile Dealers Assn. of New York, to succeed Milton J. Budlong, who recently resigned from the presidency of the Packard concern to join Gaston, Williams & Wigmore-exporters.

**R. H. Williams,** formerly district manager of the Studebaker Corp. at Indian-

Claiming that the electric vehicle industry lacks progressiveness, and pointing to the above scene to prove it, Harry R. Kelly, of the Purity Baking Co., Minneapolis, Minn., writes THE COMMERCIAL VEHICLE to call attention to the fact that the fleet of forty electric trucks depicted above was made by the company itself because no manufacturer would produce a vehicle to the company's specifications. Mr. Kelly says: "These electrics are owned by the Purity Baking Co. and were built in its shop after designs by the writer. Owing to the failure of three electric truck manufacturers to demonstrate successfully and the lack of intelligent handling of the proposition by other concerns, the Purity Baking Co. was forced to build its own vehicles. I believe if the proposition had been handled by direct agents that one of the concerns would have received the order. Electric truck manufacturers are lacking in sales organization, likewise in not fully acquainting purchasers with the manner in which electrics should be handled. Four men, including the washer, look after the forty trucks of the Purity company." The Purity electrics have two speeds, the low gear being used to save current on hills, etc.

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apolis, has been appointed manager of the Detroit branch of the Studebaker Corp. Mr. Williams became connected with the Studebaker corporation last January, leaving the F. B. Stearns Co., with whom he had been connected for 4 years. He succeeds W. T. Bush, who becomes assistant sales manager under R. T. Hodgkins, in charge of the territory east of Detroit.

**J. E. Grady**, formerly connected with a typewriter concern in Chicago, has been made a sales manager for the Studebaker Corp., with headquarters in Walkerville, Ont., where he will handle Studebaker sales of trucks and cars in that quarter of the Dominion.

**Bosch Magneto Co.**, New York City, has announced that contracts for magnetos have been made with the Federal Motor Truck Co., Detroit, the Atlantic Refining Co., Philadelphia, and the Republic Motor Truck Co., Alma, Mich.

**Edward F. Maloney** has been appointed to the position of manager of the New York branch of the Gibney Tire & Rubber Co., starting September 27. Mr. Maloney was formerly in charge of the solid tire department of the New York Firestone branch. General Sales Manager Gilbert of the Gibney company has left for the coast to establish a branch in San Francisco.

**F. R. Guyon** has recently been appointed assistant manager of sales for the Elyria Iron & Steel Co., Elyria, O., which company has just completed a new factory in Cleveland, O., for the manufacture of steel tubing.

**Timken-Detroit Axle Co.**, Detroit, has just completed and put into operation its new four-story structure on Clark avenue as an assembly plant for its worm-driven axles for motor trucks. The first floor is used for incoming stock and as a general receiving room, the second and third floors are given over to the machining of axle parts, and the fourth floor for assembling the complete units. The basement is used as a stock room. The total floor space of the building is about 100,000 square feet. The building cost close to $500,000, including the cost of the machinery installed. Other structures are now in the course of construction which will eventually double the present size of the plant. Plans have been completed for the new drop forge building. This will be of one-story steel construction, 400 feet long and 70 feet wide, with a reinforced concrete bed for the hammers extending down the center. It will be equipped with Wicks upright boilers to generate 1,200 horsepower. The exhaust steam from the plant will be used in a turbine motor to generate electric current for lighting purposes. There will be thirty-five hammers in the structure and the forgings will be carried to these on magnetic

**An American ship and an American truck in France. The chief difference between the two is that the American ship is engaged in peaceful commerce and displays a gigantic picture of Old Glory on its side as a passport through the lines of the German underwater patrols; while the American truck is one of 1,000 Jeffery ¾-tonners purchased by France for very belligerent purposes. The protection which is carried by the truck is somewhat more tangible if less picturesque than a painted flag, it is a steel guard in front of the radiator, to keep careless soldiers from clogging the radiator apertures**

cranes running on overhead tracks. The estimated cost of the new building, equipped, is placed at about $260,000.

**"Burd Ring Wisdom"** is the title of the new house organ of the Burd High Compression Ring Co., Rockford, Ill. The initial issue, which is dated September 15, 1915, is a 9 by 11 pamphlet of eight pages, which pictures and describes the Burd ring and tells in what way it differs from other piston rings.

**"Boom"** is the title of a striking 16-page booklet recently distributed by the Firestone Tire & Rubber Co. to its dealers. The book describes the various devices supplied dealers for publicity work, consisting of folders, catalogs, stationary and bill-heads, steel road posters, enamelled flange signs, cloth signs, posters and hangers, tube bags, lantern slides for motion picture advertising, electrotypes for newspaper advertising, window displays, sales letters, blotters and khaki suits for repairmen, with clever illustrations and prices to dealers in quantities.

**"Mileage Talks"** is the title of an attractive book recently issued by the Firestone Tire & Rubber Co., Akron, O., devoted to a description of Firestone pneumatic tires, rims and accessories, and their process of manufacture.

**"Upsetting Mileage Traditions"** is the title of a 14-page brochure just published by the B. F. Goodrich Co., Akron, O. The book is devoted to a description of the construction and theory of the Goodrich De Luxe wireless tire and to a number of testimonials from truck users who have experimented with the new tire.

**Tractors Are Wanted In Greece** according to the report of an American consular agent in that country, who states that a concern there is desirous of receiving bids for about twenty-five motor tractors of 10, 20 and 30 tons capacity, capable of negotiating grades of 18 per cent. The vehicles must be of the four-wheeled type. The name of the concern may be obtained through the Bureau of Foreign and Domestic Commerce, Washington, D. C., by letter, mentioning Foreign Trade Opportunities, No. 18143.

**Motor Truck Tires Are Wanted in Norway,** according to Foreign Trade Opportunity No. 18129, published in the *Commerce Reports* of September 27, 1915, which states that a dealer in rubber goods in Norway is anxious to form commercial relations with American manufacturers of pneumatic tires for passenger motor vehicles and solid tires for motor trucks. The dealer desires to act on an agency basis and can give bank references. His name may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C.

**Motor Vehicle Accessories Are Needed in Greece,** according to a trade opportunity published in the *Commerce Reports* of September 14, 1915, which states that a firm in that country is desirous of being placed in touch with representative American manufacturers for the purchase of motor vehicle wrenches, oil cans, shock absorbers, magnetos, ball bearings, oil and grease, and jacks. The name of the company may be secured from the Bureau of Foreign and Domestic Commerce, Washington, D. C., file number, 18289.

**Rubber Shipments** from the Amazon Valley to Europe for the month of July, 1915, the first month of the new rubber crop, were considerably less than one-half what they were during July, 1914, although the shipments to the United States were more than 30 per cent larger than in the same month of the year previous. The total shipments in July, 1914, amounted to 4,634,018 pounds, and in July, 1915, to 4,252,802 pounds. The total pounds shipped to the United States in July, 1914, was 2,252,204, while in July of this year it was 3,446,949.

**Internal Gear Drive News** is the title of a small 7 by 7-inch pamphlet published by the Internal Gear Drive Assn., Detroit, to detail the growth of the internal-gear-drive idea, as applied to motor trucks throughout the world, but

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particularly in the United States; to tell of the service internal-gear-driven axles are giving and to picture and describe the men who have pinned their faith to that type of design. The first issue of the *News* contains two interesting illustrations of internal-gear-driven trucks in use abroad, one a Schneider, used by the French Army, and the other a Berna truck in the service of the Austrian military forces.

**1915 Cleveland Motor Vehicle Directory**, published by the Cleveland Automobile Club, Cleveland, O., is just off the press, and contains a complete motor vehicle directory for the city of Cleveland and Cuyahoga county, arranged according to license numbers. The directory gives a list of all the licenses issued with the name and address of the owner and the make of vehicle. The publication also contains the official roster of the club and illustrations of its officers. It is 4 by 8½ inches in size, thus making it convenient to carry in one's coat pocket. It contains 300 pages of text matter and sells for 50 cents per copy.

**A Galveston Printing Press Was Run By a Motor Truck** after the tropical gale which recently passed over the gulf coast of the United States. The *Galveston Tribune's* pressroom was put out of business by the storm. The floors of the building were flooded and as the city's gas and electric plants were cut of commission there was apparently no hope of securing power to operate the presses to get out an edition. Ingenuity came to the rescue and the management secured a 3½-ton Wichita truck with a power-dumping body. This was put in position, the rear wheels jacked up and a pulley rope wound around the wheels to other pulleys on the press. This timely and unique method of power applicnt was responsible for printing the first edition of any paper after the storm had subsided. The Wichita truck used in the work was also caught in the flood and thoroughly soaked and it is remarkable that it was in such condition to render the unique service to the press.

**Consular Regulation of Foreign Countries, Canada and Latin America**, is the title of a sixty-six-page pamphlet just issued by the Bureau of Foreign and Domestic Commerce, Deparment of Commerce, Washington, D. C., for the purpose of aiding American exporters in the shipments of their goods to Latin American markets. The booklet contains a complete description of the shipping documents required in all the Latin-American countries and Canada; gives fac-similes of Consular invoices used in those countries, and points out such peculiar features as may be overlooked by the average exporter. The material has been compiled with great care and the chapter for each country has been submitted for revision to the consular representative of that country in the United States. Many American banking institutions and commission houses have also been consulted. The pamphlet should be of great value to firms shipping goods to Latin-American countries. The booklet is known as Tariff Series No. 24 and may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents per copy.

Labor Day was celebrated in Cliotonville, Wis., in a novel manner. The Four Wheel Drive Auto Co., which is the principal manufacturing concern in the town, assisted the city in its festivities by staging a monster truck parade in which $450,000 worth of Four Wheel Drive trucks took part. These trucks were part of a single war order shipment. Other features of the day's entertainment were a barbecue of two oxen and a concert provided by three bands. In the afternoon the company put on some tests to show the tractive power of a Four Wheel Drive truck and to demonstrate a winch now being installed at the rear end of the frame of these trucks, by order of the foreign purchaser. It is the plan of the buyer to use these trucks on roads so soft that they are now impassable for any vehicle, but by means of this winch it is expected that the trucks can be pulled across all spots where no footing is possible. At the demonstration on Labor Day a loaded 3-ton truck with a trailer filled with lumber was run into the river, placed where it was hopelessly stuck, then the cable, of which the winch carries several hundred feet, was run out and attached to a post 200 feet away, the winch started and both truck and trailer pulled out of the mud and over the steep bank. A free dance in the evening at the newly erected factory addition was another of the enjoyable features, and more than 2,000 dancers were on the floor of the large building

## Commercial Motor Vehicle Agencies Recently Established Throughout the Country

| | | |
|---|---|---|
| Anamosa, Ia. | Kisselkar | Anamosa Auto Co. |
| Brockton, Mass. | Kisselkar | Kisselkar Brockton Branch |
| Burlington, Vt. | Kisselkar | Todd & Tupper |
| Des Moines, Ia. | Kisselkar | Guarantee Motor Co. |
| Fonda, Ia. | Kisselkar | Kenning Auto Co. |
| Hartford, Wis. | Kisselkar | Schauer Bros. |
| Hastings, Minn. | Kisselkar | A. R. Wallwolge |
| Lanesboro, Minn. | Kisselkar | McMaster & Ward |
| Lincoln, Neb. | Kisselkar | A. H. Meyers |
| Marion, Wis. | Kisselkar | F. J. Haufe |
| Mesquite, Tex. | Kisselkar | Humphreys & Vanston |
| Norwalk, Conn. | Kisselkar | F. E. Lockwood & Co. |
| Philadelphia, Pa. | Kisselkar | Baker-Price Co. |
| Schenectady, N. Y. | Kisselkar | Wm. D. Havens |
| White Plains, N. Y. | Kisselkar | Kisselkar Garage Co. |
| Blanco, Tex. | Wichita | Charles F. Crist |
| Dallas, Tex. | Wichita | W. T. Fulton Co. |
| Ft. Worth, Tex. | Wichita | W. W. Henkel Co. |
| Houston, Tex. | Wichita | M. S. Taggart |
| Memphis, Tenn. | Wichita | Southern Automobile Co. |
| Stamford, Tex. | Wichita | C. E. Simmons |

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# WHITE MOTOR TRUCKS

*IN THE SERVICE OF*

## DRY GOODS AND DEPARTMENT STORES

"DELIVERY" is a most important factor in store service. It outwardly represents the standard of service for the whole establishment.

A high standard of service has been established by the successful retail merchants of America and any merchant who would be successful must make his service measure up to this standard.

In towns and cities everywhere, dry goods merchants are installing White Motor Trucks because the modern standard of service demands it and because competition makes necessary the most finished methods in every department. It is better to be ahead of your competitors in adopting new and better methods than to follow after they set the pace.

Equip your delivery department with White Trucks and you may rest assured of having the most perfected motor trucks made—White Trucks will be a credit to your establishment and will deliver your goods with the greatest possible economy.

*MORE THAN 800 WHITE TRUCKS ARE OWNED BY DRY GOODS AND DEPARTMENT STORES IN THE UNITED STATES, CANADA AND ENGLAND.*

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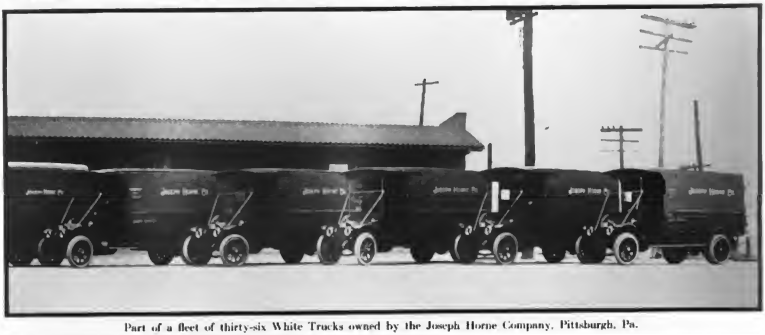
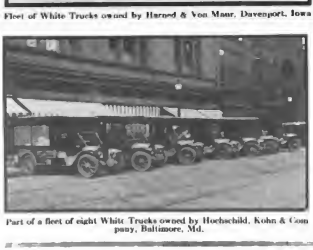
# WHITE MOTOR TRUCKS



Part of a fleet of thirty-six White Trucks owned by the Joseph Horne Company, Pittsburgh, Pa.

Part of a fleet of forty-four White Trucks owned by Kaufmann Bros., Pittsburgh, Pa.

Fleet of White Trucks owned by Harned & Von Maur, Davenport, Iowa



Part of a fleet of eight White Trucks owned by Hochschild, Kohn & Company, Baltimore, Md.

The Bailey Company

Cleveland, Ohio April 15, 1915.

The White Co.,
City.

Attention - Mr. A. L. Hayes.

Gentlemen:-

We have always looked upon our Delivery Department as one of the most important branches of our business and, in order to make it as efficient and up to the minute as we could possibly make it, we sold some of our horses and wagons and bought our first White Auto Truck. That was just five years ago when the auto truck was practically in its infancy, and, from time to time we purchased other makes of trucks and, incidentally, experience.

While the experience came high in depreciation and maintainance, we figured it was the best money we had ever spent, because we found the cost of operation and maintenance was so high on the other makes of cars we were operating, that we would be money ahead to scrap them.

It doesn't seem reasonable, does it? But, it is a fact, nevertheless. Some of these cars in question were costing us at a rate of 10¢ per package to deliver with and on seven White cars, for the past nine months, ending April 1st, 1915, our average cost per package has been 5¢. You can readily see that a White Truck, delivering 200 packages a day, at an average saving of 5¢ a package, in one year the saving would be approximately $1000.00 and, in one year, the truck has paid for itself on the saving in the low cost of operation and depreciation over the other makes of trucks we have had in operation.

We keep a record of every item of expense on each individual car and each car is credited with each delivery it makes. In that way we determine our cost per package. Therefore, it is an easy matter to figure out why we could not afford to operate with anything else but White cars and that is the reason you have recently booked us for three more three-quarter ton and two more one and one-half ton trucks.

Yours truly,

THE BAILEY COMPANY.

By M. N. McLeod

MNMcG:H

THE WHITE COMPANY

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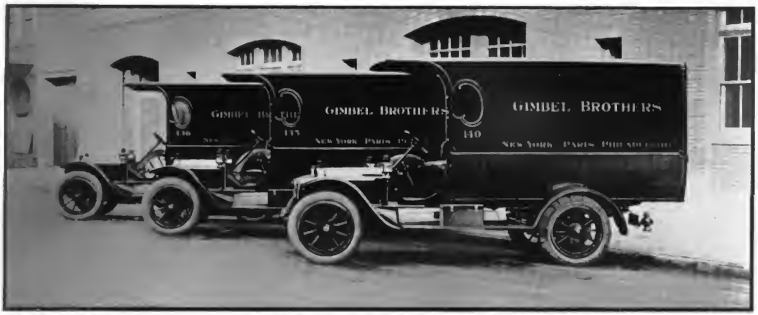
# WHITE MOTOR TRUCKS




Part of a fleet of fifty-four White Trucks owned by Gimbel Brothers, New York City

## ANNUAL SAVING IN COST OF OPERATING WHITE TRUCKS PRACTICALLY EQUALS THE INITIAL COST.

This was the conclusion reached by The Bailey Company after a careful compilation of cost records covering the operation of their White fleet.

The letter on the opposite page is proof of the fact that low price should be no inducement to the truck buyer. Large companies, with their thorough methods, make it a point to know which truck will eventually be the most economical, regardless of first cost. And smaller companies, to whom the investment is perhaps more important, also realize that when the books are balanced, the profit on a motor truck does not depend upon its purchase price.

In purchasing motor delivery equipment, the saving of a few hundred dollars at the outset does not mean economy in the long run. It is the reliability, durability and low operating expense which determines the ultimate value of any motor truck.

The White Company knows how to build motor trucks to give the most economical results in store service; this is proven by the fact that the fleets of the greatest stores are composed largely of White Trucks. By a rigid process of experimentation and elimination, these firms have discovered that White Trucks give the greatest service for the smallest ultimate cost — and for this reason they continue to buy White equipment.

Part of a fleet of thirty-five White Trucks owned by The Rosenbaum Co., Pittsburgh, Pa.

Part of a fleet of fourteen White Trucks owned by The May Company, Cleveland, Ohio

Fleet of White Trucks owned by Bonwit Teller & Co., Philadelphia, Pa.

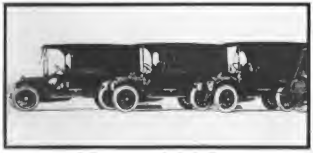
THE WHITE COMPANY

# WHITE MOTOR TRUCKS

Part of a fleet of forty-two White Trucks owned by Kaufmann & Baer Company, Pittsburgh, Pa.

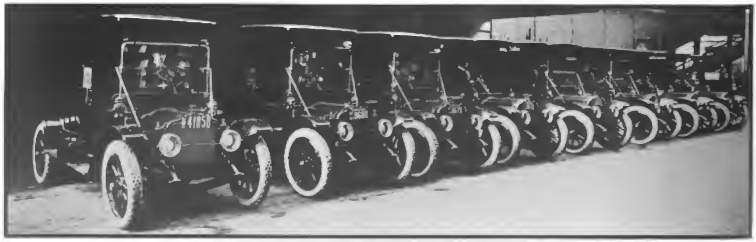
Fleet of White Trucks owned by Scruggs-Vandervoort-Barney Dry Goods Company, St. Louis, Mo.

Part of a fleet of nine White Trucks owned by the Hudson's Bay Company, Calgary, Alta., Vancouver, B. C. and Winnipeg, Man., Canada



Three of the six White Trucks owned by Bullock's, Los Angeles, Cal

Fleet of White Trucks owned by The Palais Royal, Washington, D. C.



Part of a fleet of ten White Trucks owned by Saks & Company, New York City

THE WHITE COMPANY

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# WHITE MOTOR TRUCKS

Part of a fleet of fifteen White Trucks owned by the T. Eaton Company, Ltd., Toronto, Ont. and Winnipeg, Manitoba, Canada

Fleet of White Trucks owned by the Symons Dry Goods Company, Butte, Mont.

Part of a fleet of ten White Trucks owned by The Higbee Company, Cleveland, Ohio

Fleet of White Trucks owned by Wolff & Marx Company, San Antonio, Tex.

Part of a fleet of eight White Trucks owned by The G. M. McKelvey Company, Youngstown, Ohio

Part of a fleet of ten White Trucks owned by The Hub, Chicago, Ill.

THE WHITE COMPANY

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# WHITE MOTOR TRUCKS

Part of a fleet of twenty-two White Trucks owned by Oppenheim Collins & Company, New York City, Cleveland, Ohio, Newark, N.J. and Brooklyn, N.Y.

One of the eleven White Trucks owned by McCreery & Company, Pittsburgh, Pa.

One of the seven White Trucks owned by J. N. Adam & Co., Buffalo, N. Y.

One of the six White Trucks owned by Loeb & Taylor, New York City

One of the fifteen White Trucks owned by Marshall Field & Co., Chicago, Ill.

## WHAT OWNERS SAY

***A High Class Advertisement*** The three White Trucks which we have been operating since last August are giving splendid satisfaction.

In addition to the economical operation, we consider that we are receiving much benefit from the cars as a high class advertisement.

THE SYMONS DRY GOODS CO.
Butte, Mont. *J. E. Oppenheimer, Treas.*

***Continuous Repeat Orders Prove White Superiority*** We have been using White Trucks for some time and not only have they proven satisfactory, but the fact of our placing a repeat order a short time ago is additional evidence that they meet the demands.

THE MAY COMPANY,
Cleveland, Ohio. *R. K. Simonson, Gen'l. Supt.*

***No Better Truck on the Market*** We have a number of White Trucks in our various stores, and have used same for the past seven months. We are entirely satisfied with the service we have so far received, both from an economical and durable standpoint; and feel that for our particular commerical purpose we could find no better motor truck in the market.

New York City. OPPENHEIM, COLLINS & CO.

***Fleet Always in Running Order*** The first White Truck we used ran 23,000 miles in sixteen months without causing us to expend any money for repairs other than tires.

This record was so good that it decided us in favor of the White Truck for developing our delivery service.

We have been particularly impressed with the ease with which White motors do their work and with the unusual lack of trouble.

None of our White Trucks have ever been out of commission enough to cause any inconvenience to our deliveries. We attribute a great deal of this to the simplicity of the engine and the ease with which the White Truck is understood and operated.

THE STROUSS-HIRSHBERG CO.,
Youngstown, Ohio. *I. G. Goldsmith, Gen'l. Mgr.*

One of the eighteen White Trucks owned by Stern Brothers, New York City

One of the two White Trucks owned by Mannheimer Brothers, St. Paul, Minn.

One of the three White Trucks owned by The Peoples Store Company, Tacoma, Wash.

One of the twenty-eight White Trucks owned by Boggs & Buhl, Pittsburgh, Pa.

THE WHITE COMPANY

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# WHITE MOTOR TRUCKS

Part of a fleet of eight White Trucks owned by The Jones Store Company, Kansas City, Mo.

One of the five White Trucks owned by J. Goldsmith & Sons Co., Memphis, Tenn.

One of the seven White Trucks owned by Sanger Brothers, Dallas, Texas

Part of a fleet of three White Trucks owned by Roberts Brothers, Portland, Ore.

One of the four White Trucks owned by Strawbridge & Clothier, Philadelphia, Pa.

## WHAT OWNERS SAY

***Selected White Truck After Experiment*** We take great pleasure in informing you that each one of our seven White Trucks has exceeded our expectations. At present we are using them to do work formerly done by the local express companies. They are subject to the most severe tests, but we have not the least reason to complain of the service they have given us.

Before purchasing the White Trucks we tried several other makes, and after a thorough test, came to the conclusion that the ¾-ton White now in our service is the best adapted to our requirements.

FRANKLIN SIMON & Co.,
New York City. *A. J. Simon.*

***Four Years of Perfect Service*** In the four years that we have operated White Trucks we find they have given very satisfactory service. Among some of the important advantages of motor truck delivery as applied to our line of business is that we are able to cover extensive territory, not only in shorter time, but with fewer vehicles than would be required if horses were used.

THE HIGBEE Co.,
Cleveland, Ohio. *W. T. Higbee.*

***Owners of 40 White Trucks, Say They're Best*** It gives us great pleasure with our long experience of delivery in Pittsburgh, which is a very hard city in which to make deliveries, to say that with your trucks we have had the greatest success, and are now giving the finest delivery in our city.

We have tried them all and find the White Truck is the best for department store delivery in Pittsburgh.

KAUFMANN & BAER Co.,
Pittsburgh, Pa. *W. H. Letzkus.*

***Economical and Simple to Operate*** We can say from our experience that White Trucks are giving good service. We are pleased with the low cost of upkeep, the simplicity and ease of management of these trucks.

Pittsburgh, Pa. BOGGS & BUHL, *Inc.*

One of the five White Trucks owned by Abraham & Straus, New York City

One of the ten White Trucks owned by Franklin Simon & Co., New York City

One of the three White Trucks owned by Jas McCreery & Co., New York City

One of the six White Trucks in the service of The Halle Brothers Company, Cleveland, Ohio

THE WHITE COMPANY

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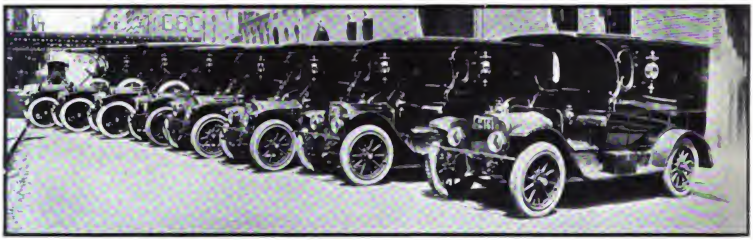
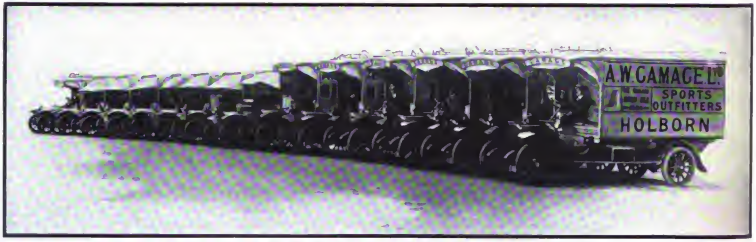
# WHITE MOTOR TRUCKS

Part of a fleet of seventeen White Trucks owned by Mandel Brothers, Chicago, Ill.



Part of a fleet of fifty-one White Trucks owned by B. Altman & Company, New York City




Fleet of fourteen White Trucks owned by A. W. Gamage, Ltd., London, England

***White Trucks Received the ONLY GRAND PRIZE and Highest Award for Motor Trucks at the Panama-Pacific International Exposition***

THE WHITE COMPANY
CLEVELAND

*LARGEST MANUFACTURERS OF COMMERCIAL MOTOR VEHICLES IN AMERICA*

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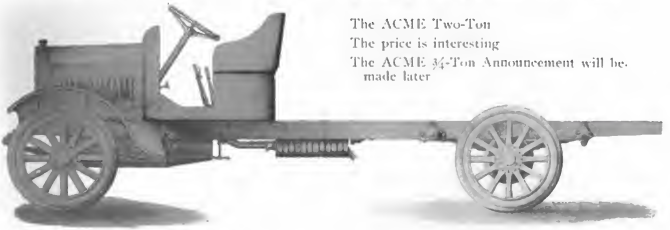
# AN AGENCY OPPORTUNITY FOR YOU

If you are an alert, aggressive dealer and if you want to increase the profit-producing power of your territory, **you can do it with**

# THE ACME MOTOR TRUCK

**This sturdy two-ton truck is of practical design, substantially constructed and composed of the highest grade standardized units.**



The ACME Two-Ton
The price is interesting
The ACME ¾-Ton Announcement will be made later

**Back of this truck is a strong financial organization—with permanency assured—a well defined policy in the interest of dealers and profitable dealer co-operation which will make this agency attractive.**

## THE ACME SPECIFICATIONS

Continental motor with automatic speed governor
Warner & Brown-Lipe transmission
Timken front axle
Timken worm drive rear axle
Timken bearings throughout
Heat treated pressed steel frame
Detroit self-lubricating springs
Gemmer steering gear
Eisemann waterproof magneto
Rayfield carburetor

These standard units demonstrate the class of the Acme truck

**INVESTIGATE NOW**

Merely sign and mail the coupon and we will afford you as a reputable dealer every opportunity for careful investigation of this agency opportunity.

**Cadillac Auto Truck Company**
**10 Mitchell Street Cadillac, Michigan**

**Cadillac Auto Truck Co.**
**10 Mitchell St. Cadillac, Mich.**

We would like full particulars relative to your dealers' proposition on the ACME MOTOR TRUCK line.

Name.....

Address.....

.....

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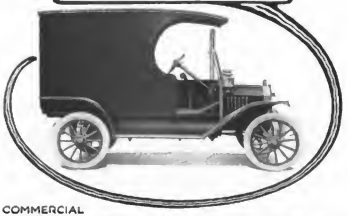
WISH BONE
COMMERCIAL BODIES



COMMERCIAL BODY for FORD CARS

**Ideal for Express and Delivery Service**

The famous "Wish-bone" line of commercial bodies are shipped fully painted and trimmed. They are ready to use immediately upon arrival.

**DEALERS**

There is a golden opportunity for the man who is prepared to supply the demand for "Wishbone" commercial bodies. The Ford is everywhere.

Write immediately for details of our Co-operative Dealer Plan. **Liberal discounts to Wadsworth agents.** Big profits are in store for wide-awake men who act quickly.

**The Wadsworth Manufacturing Co.**
**1301 Jefferson Avenue** **Detroit, Mich.**

WEST'S CAST-STEEL WHEELS for MOTOR TRUCKS

**Are used by America's leading Truck Builders**

These wheels were designed by, and are built under the supervision of, experienced engineers. They have been thoroughly tested and have proved they will stand hard usage and abuse.

Over 8,000 WEST'S CAST-STEEL WHEELS are now used on trucks and not one of them has failed to give satisfaction.

Specify WEST'S CAST-STEEL WHEELS on every heavy truck you buy.

**The West Steel Casting Company**
805-815 E. 70th St. Cleveland, Ohio

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WYMAN & GORDON

The tendency to overload and to drive them beyond sane limits is an ever-present incentive to the truck manufacturer to make the structure of his vehicles as strong as perfectly processed steel can make it.

WYMAN & GORDON Guaranteed Forgings are dependable for this purpose—and accurate to the closest possible limits.

The Wyman & Gordon Company
Worcester, Mass.
Cleveland Detroit

GUARANTEED FORGINGS

Coal Bodies for Any Chassis

has been a specialty with us for years. We make them from 2 to 10 tons to your specifications and for *your* special needs. Hand or power hoist, side or rear delivery. They are the most economical and efficient coal bodies yet devised.

The 5-ton Saurer shown here has been in daily use for three years—we have yet to hear a complaint regarding this body. It is a side delivery, hand hoist. Discharges load in four minutes.

Write us for photos and particulars. We will be glad to assist you with your problem.

New Ideal Wagon Works
1843-45-47 Park Avenue, near 126th Street, New York

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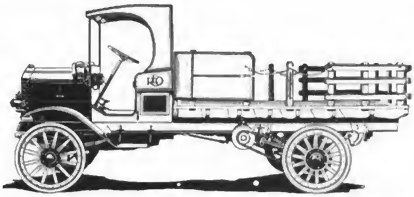

## Going Like Hot Cakes!

DEMAND is simply tremendous for this great 2-ton Reo. And it is so general seems as if this truck supplied almost all heavy trucking needs.

LIVE REO DEALERS are reaping the harvest.

**Reo Motor Truck Co.**
Lansing, Mich., U. S. A.

## Ross Steering and Differential Gears

**Will Help Sell Your Trucks**

They are
**STANDARD**
on good motor truck construction

**Investigate**

our new complete line of fore and aft steering gears.

Enormous bearing surfaces
Perfect lubrication
Best material throughout
Finest workmanship

Built in the largest and newest steering gear factory in the United States.

*Write for catalog*

**ROSS GEAR & TOOL COMPANY**
790 Heath Street Lafayette, Ind.

## U. S. MOTOR TRUCKS

—have won the confidence of their owners throughout the world by 5 years of matchless performance, service and durability.

The Agency Is a Valuable Asset

RELIABLE DEALERS WANTED

Capacity
2 Ton
2½ Ton
3 Ton
4 Ton

If you are considering taking on an agency, or should be dissatisfied with present arrangements, WRITE US. Our proposition is a money-maker. Address Contract Dept. D.

**THE UNITED STATES MOTOR TRUCK CO., Cincinnati, Ohio**

## District Managers Wanted

To place agencies for trucks. A strong organization now entering the field offers you an excellent opening. All correspondence confidential.

**Address Truck, care of Commercial Vehicle**

## Bearings

We carry in stock for immediate delivery, various types and sizes of Ball and Roller Bearings.

**THE GWILLIAM COMPANY**
New York: 253 West 58th St. Phone Columbus 8356
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## LIGGETT SPRING & AXLE COMPANY

**MONONGAHELA, PA.**

QUICK DELIVERIES

STYLE F. A. 2060

**Front and Rear Axles Complete with Roller Bearings** **Springs—High Carbon or Alloy Steels**




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## Always on the Job

**Standard** DETROIT USA

CHAIN AND CHAINLESS **TRUCKS**

**Dealers Receive Real Cooperation**

STANDARD Trucks have been sold in almost every large city of the U. S. A. with practically no advertising, which demonstrates that the remarkable mechanical perfection of STANDARD Trucks have won and held the confidence of the buying public. It will pay "live dealers" to investigate our very liberal agency proposition. Send for Booklet B-26 describing all capacities.

**Standard Motor Truck Co., Detroit, Mich.**

CONSTANT-DEPENDABLE-SERVICE
PITTSBURGH MODEL ENGINE COMPANY
MODEL MOTORS
PITTSBURGH PA.

## Annular Ball Bearings Reground

ONE FIRM ONE SERVICE

ONE GUARANTEE

BACK OF

EVERY BEARING REGROUND

BY

**Ahlberg Bearing Company**

2636 Michigan Avenue Chicago, Ill.

1790 Broadway, New York
93 Massachusetts Ave., Boston
1841 Euclid Ave., Cleveland
805 Woodward Ave., Detroit
325 West Pico St., Los Angeles
2831 Locust St., St. Louis

# MODERN 1915

## GET IN LINE

With your co-operation, we are able to supply you with just the truck that will give the most satisfactory and profitable results in your business—Chain or Worm drive models.

Model "H" 1½ Ton Chain Drive. Model "L" 1 Ton Worm Drive
Model "M" 1½ Ton Worm Drive. Model "P" 2 Ton Chain Drive

**The Bowling Green Motor Truck Co., Bowling Green, Ohio**




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A Truck Without a

Veeder Hub Odometer

Is Like a Man Without a Memory

This Veeder Hub Odometer registers distance traveled backward as well as forward; there is no way to disconnect it by slipping gears out of mesh. Price, complete, $20. Special model for Ford Cars, $15.

Cyclometers for Bicycles and Motorcycles. Odometers for Automobiles and Horse Drawn Vehicles. Counters for practically every purpose. Tachometers, Tachometers and Fine Die Castings.

VEEDER MFG. CO.

54 Sargeant Street Hartford, Conn.

EISEMANN

OF THE 93 manufacturers who use Eisemann magnetos in this country, 69 are truck makers.

If you are not one of the 69 Eisemann users you are not getting the greatest possible ignition efficiency.

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32-33rd Street, Brooklyn, N.Y.

New York, 245 West 55th Street

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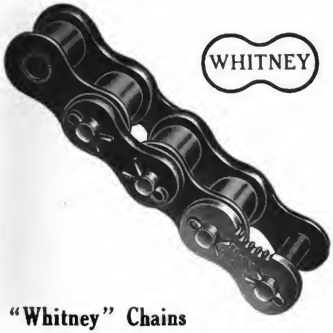



## "Whitney" Chains

are made by specialists in the foremost organization for chain design and manufacture in America. Our aim is dependability of service under hardest conditions, and our success in this is shown by the standardization of "Whitney" Chains by the leading motor truck makers of the country.

**The Whitney Mfg. Co., Hartford, Conn.**

Chains—Keys—Hand Milling Machines

# Quality and Character

It is essential to have the same high standard of quality and character in the commodities you build as it is to have it in the men who build and sell those commodities. Sanford Trucks are built for quality and character by men who know how.

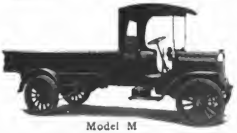
Model O

Model O
¾ Ton
$1350
Express

$1290
Chassis

Model M
4000 lbs.
$2000
Express

$1910
Chassis

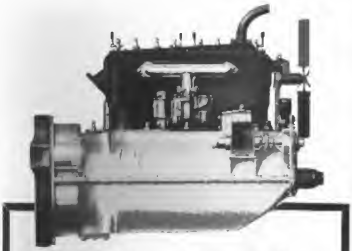


Model M

Dealers are requested to send for Sales Plan and inquire for open territory.

**Sanford Motor Truck Company**

Syracuse New York



## A Real Long Stroke Truck Motor

**Wisconsin**

CONSISTENT

Type TU
4 in. bore, 6 in. stroke.

Type UU
4¾ in. bore 6 in. stroke

Cylinders interchangeable

Note these features

CYLINDERS Cast en bloc
CRANKSHAFT Four bearing, chrome nickel steel, 2 in. diameter
VALVES Rich Tungsten steel
CONNECTING-ROD BEARINGS [illegible] in. long 2 in. diameter
BEARING [illegible]
CAM SHAFT [illegible]
OILING SYSTEM [illegible]
POINT [illegible]

Write today for detailed specifications and [illegible]

WISCONSIN MOTOR MFG. CO., [illegible] MILWAUKEE, WIS., U. S. A.

FAFNIR
SEND FOR CATALOG
FAFNIR
BEARING COMPANY
NEW BRITAIN, CONN.

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## HEAT TREATING

*The True Efficiency in the "Lavine" Steering Gear*

**A Gear With a Worm and Split Nut**

Not the usual worm and pinion device.

Split nut combination with trunnion gives double strength.

Each and every working part heat-treated, pack hardened, pot cooled.

Treatment effected by men expert in the science of metals and annealing.

*It is Lavine thoroughness which gives security*

*Write for Catalog and Data Sheets*

**Lavine Gear Co., Racine, Wis.**

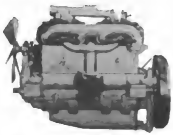


## Baker Electric Trucks

Trucking by Electric power is not only the cleanest and easiest method but the least expensive. Facts and Figures will be quoted that corroborate this statement or better advise us you want a demonstration.

**The Baker, R. & L. Company, Cleveland, O.**

Manufacturers of Baker and Rauch & Lang pleasure cars and Baker trucks.



## Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor **specialists.** The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

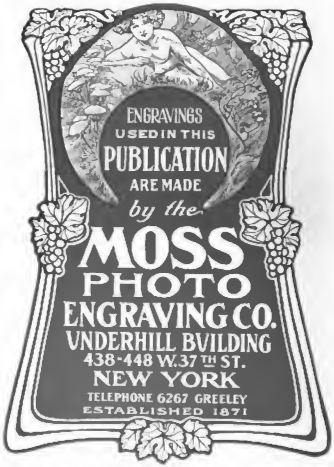
We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

**BEAVER MFG. COMPANY**

**Milwaukee Wisconsin**









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# G. V. ELECTRIC TRUCKS

SIX MODELS: 1,000 POUNDS TO 5 TONS

Nearly 5,000 in use
Catalog on request

**General Vehicle Company, Inc.**

GENERAL OFFICES AND FACTORY
LONG ISLAND CITY, NEW YORK

NEW YORK::CHICAGO::BOSTON::PHILADELPHIA

2813

# RECORDOGRAF

**(A Tape-recording Instrument)**

Gives a permanent record of the entire operation of your trucks. It shows

1. Time truck is moving
2. Time truck is still
3. Distance covered
4. A complete record of speed.

You have a record of every stop. It is an invaluable help to you in getting an efficiency and economy record of deliveries.

*Highest Award and Go'd Medal at the Panama-Pacific Exposition*

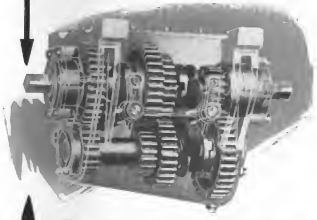
*Write for Folder and Prices*

**AMERICAN TAXIMETER COMPANY**

*Mfgrs. of Jones and Popp Taximeters*

131 West 39th Street New York

# Cotta Transmission



## The Long-Life Transmission

—that lasts, and preserves your car—because with years of experience, and expert ideas of leading engineers, a mechanically perfect mechanism has been secured.

COTTA Transmission is a selective type, individual clutch system, with all gears always in mesh.

Furnished for attachment to any well-known motor, in Unit Power Plant construction.

**Cotta Transmission Company**

814-18 S. Main St. Rockford, Ill.

# Garford

Garford Trucks range from 1500 pounds to six tons in capacity.

They are designed and built by men who have spent their lives in the study of motor trucks.

They are backed by one of the strongest organizations in the industry.

Bodies are provided to meet all requirements.

***Write for catalog. Please address Dept. 103***

The Garford Motor Truck Co., Lima, O.

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**Cotta "Short Series" Transmission**

## Suitable for Any Drive

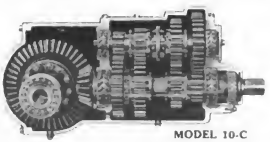
—is manufactured in various sizes and styles of case, for either double side chain or shaft drive. For special requirements, in quantities.

Strong, and rigidly built of best materials. All parts standard, to micrometer measurements.

**Next time insist on *Cotta "Short Series" Transmission* for economy.**

**COTTA GEAR CO.**

720-730 Sixth Street Rockford, Illinois



MODEL 10-C

## By Jingo!—
## That's Real Service

said one of our customers.

Yes! and we can give *your* felt orders the same prompt attention if you'll let us.

Why not try doing business with an A-1 house and get "what you want when you want it"?

Dependable goods only; accuracy in manufacture, prompt service and attractive prices are the watchwords of our business.

***"If it's made of felt, ask Booth"***

***Write—Wire or Phone***

## The Booth Felt Co., Inc.

440-450 Nineteenth St., Brooklyn, N. Y.
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12th St. and Grand Trunk R. R., Detroit, Mich.

SEVENTH EDITION! ENTIRELY REWRITTEN!

## The Gas Engine Handbook

*By*

**E. W. ROBERTS**

FOR twelve years this has been the most popular book on gas and gasoline engine design. It has been the only book of popular price and convenient size giving authoritative formulas for the design of engines of this type. Hundreds of successful engines have been designed from its guidance and thousands of gas engine designers have used it for constant study and reference.

For over three years the author has been working on this new edition. Every drawing has been made anew. The matter has been completely rewritten to include gas engine design up to the last minute. Very little change has been required in the formulas, except where new materials, higher speeds, etc., have changed conditions.

The size page has been increased to 4½ x 7½, the number of pages to 300. There is practically double the amount of reading matter, and more than double the amount of specially made illustrations over previous editions.

OVER 300 PAGES 4½ x 7½ LIMP LEATHER — OVER 80 DRAWINGS POCKET SIZE

**Price $2.00, Postpaid**

***Book Dept.* The Commercial Vehicle**
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# Celfor INTERNAL GEAR DRIVE Axles

**For Motor Trucks—Absolutely Quiet**

If you want a strong efficient unit drive that is specially designed for truck work, from one to three tons capacity, write us for complete information about the

## Celfor
## Internal Gear Drive Rear Axle

It possesses marked constructional advantages which commend it to thoughtful designers, engineers and truck makers. We shall be glad to go into these in detail on request.

**Write today for details, catalog and prices**

**Celfor Tool Company**

**Buchanan Michigan**

# Unexcelled for Light Delivery

**3-4 to 1 Ton Model S**

**$1200**

# INDIANA

Dealers will find this model one of the fastest selling truck propositions in the country. An ideal truck for the furniture man, the department store, the grocer, the butcher, or any other merchant seeking the highest possible light delivery efficiency.

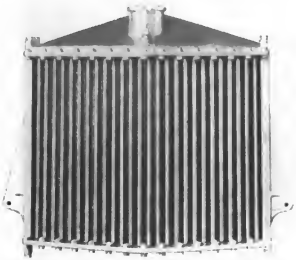
The worm drive of this truck is simplicity itself. It has long life and maximum power. Its motor—a 35 H. P. Rutenber—we consider the best motor made. Silent, sturdy, and adaptable to many different lines of business, the dealer will find the ¾ to 1 ton Model "S" a most profitable vehicle to handle. SOLD ON EASY TIME PAYMENTS. Absolutely guaranteed.

Write for information. It will be the best move you ever made.

**Indiana Trucks are Made in Sizes of 3-4 to 4 Tons**

**Harwood-Barley Manufacturing Co.**
**Marion, Indiana**

# "RADIATOR INSURANCE"



Seamless Helical Tube Cooling Sections are guaranteed for the life of the motor on which they are installed. Helical Tube construction passes the most critical requirements of foreign and domestic engineers.

**Manufactured Only By**

**Rome-Turney Radiator Company**
**Rome, N. Y.**

Brown-Lipe transmissions and differentials represent the maximum from a standpoint of efficiency and durability.

BROWN-LIPE GEAR Co
TRANSMISSIONS
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NEW YORK CHICAGO DETROIT
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# QUALITY IN EVERY SPRING

**The Cleveland-Canton Spring Co.**

**Canton Ohio**

# The Wood Hydraulic Hoist

SOLVES THE DUMPING PROBLEM FOR MOTOR DUMP TRUCKS

"Made in Detroit Only" by the

**WOOD HYDRAULIC HOIST & BODY CO., Detroit, Mich.**

Successors to WOOD HYDRAULIC HOIST CO., St. Paul, Minn.

# SOUTH BEND

## Double Duty Trucks

—once put in service—always remain in service.

Whatever your business may be there is a SOUTH BEND DOUBLE DUTY TRUCK that will give you the utmost efficiency and satisfaction.

***Wisconsin motors, Warner transmission, Sheldon axles, Ross steering gear, Bosch ignition. Either chain or worm drive.***

SOUTH BEND DOUBLE DUTY FIRE APPARATUS in all cases more than performs its duty.

Attractive Dealer Proposition. Write us at once.

**South Bend Motor Car Works**

**SOUTH BEND, IND.**




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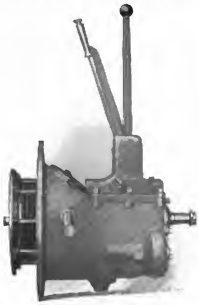
# FULLER
## Unit TRANSMISSIONS

Model "T U" ¾-1 Ton

Model "T U 2" 1½-2 Ton



*Particulars sent on request*

**FULLER & SONS MFG. CO.**
Kalamazoo, Mich.

One of six Jeffery Quads in the service of the United States Army Signal Corps. This is the most powerful portable wireless station in the world. The Jeffery Quad drives, brakes and steers on all four wheels.

**The Thomas B. Jeffery Company**
Main Office and Works, Kenosha, Wisconsin



# A Minimum of Energy Begets the Maximum of Power

## Torbensen Internal Gear Drives

**Turn 92% of Engine Power Into Useful Work**

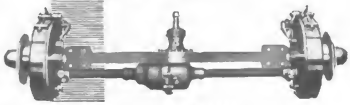
This is due in a large measure to the fact that the I-beam dead axle relieves the live axle of all load strains but in a still greater measure to the fact that the final drive gears apply their power to the driven gears on the rear wheels near the rims of those wheels.

Contrasted with chain drive axles, TORBENSEN Axles grow more effective as they work in rather than less efficient—the immediate result of wear of chains on sprockets.

Delivering 92% of the power from the motor is efficiency far beyond the ability of other axles—and 92% of the motor's power delivered to the driving wheels throughout a period double the life of other axles is efficiency that should interest you.

That is TORBENSEN FINAL DRIVE EFFICIENCY.

**TORBENSEN GEAR & AXLE CO.**
Cleveland, O.



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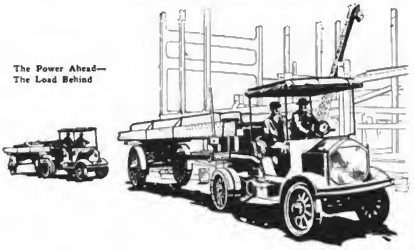
# SAVE MONEY

## By Hauling Your Loads With a KNOX Tractor

The Power Ahead—
The Load Behind



THE Knox TRACTOR

The Knox Tractor can be the motive power for three trailers, one loading, one unloading and one moving.

The Knox does not carry and push its load like a truck—it hauls it behind. With a double set of springs, no matter what the load, the tractor mechanism does not have to support an additional pound. Flexible springs for the tractor, stiff springs for the trailer.

Any kind of a load in any kind of a wagon.

*Write for our folder, "Heavy Hauling at Light Expense"*

**KNOX MOTORS ASSOCIATES, Springfield, Mass.**

New York 1872 Broadway | Boston 825 Tremont Bldg. | Chicago 1621 Michigan Ave. | Philadelphia 604 Abbott Bldg. | Kansas City 1725 McGee Street

TWENTY-ONE
MACKS SERVE
R. H. MACY & CO.

R. H. MACY & CO. HAVE JUST ADDED 12 MORE

*Mack*

WORM DRIVE TRUCKS

to their delivery fleet. Macy's positive assurance to their customers of certain and unrivalled delivery methods is guaranteed by their fleet of 21 MACKS. This is good proof of MACK efficiency in department store service.

*Send for samples of our Dealer Helps.*

Capacities 1 to 7½ tons; also 5 to 15 ton tractor trailers

INTERNATIONAL MOTOR COMPANY

64th St. and West End Ave. New York City

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EFFICIENT — ECONOMICAL

# The B.A.Gramm Truck

has been making records in every line of business in which it has been used. The following letter tells of the performance of a GRAMM 3½ ton truck used in the Coal and Builders' Supply business—

INDIANAPOLIS MORTAR & FUEL COMPANY
Indianapolis

The Gramm-Bernstein Co.,
Lima, Ohio.

Gentlemen:—
In reply to your request as to the operation of our 3½ ton Gramm coal truck and cost of same, we can give you these figures for the months of December and January, when we were pretty busy.
In December the truck was run 574 miles, made 158 trips and delivered 616 tons of coal, and figuring two men's wages, gasoline, oil, repairs and adjustments and all overhead charges against the motor truck, our net cost for the month was 30c per ton for delivery.
In January we made 187 trips, 594 miles and delivered 748 tons, at a net cost of 20c per ton.
Yours very truly,
INDIANAPOLIS MORTAR & FUEL CO.,
Albert Goepper, Vice-Pres.

*A postal or letter will bring to your desk our Special Contractors Circular, full of information*

**The Gramm-Bernstein Co., Lima, Ohio**

BIGGEST MOTOR TRUCK VALUE ON THE MARKET



THE BUDA COMPANY
BUDA MOTOR
"The part to buy the car by"
ESTABLISHED 1851

# THE LONG LIFE MOTOR

EVERY manufacturer of a *car* or *truck* knows that if a motor has *long life* there is little else that needs be said about it. *Long life* necessarily implies that power, design, balance, materials and workmanship are all that they should be.

It is therefore with considerable pride that we offer to exhibit to you astonishing evidence of the exceptional durability of the BUDA MOTOR.

It may mean much to you in maintaining permanent good relations with your trade to equip your output with BUDAS. May we show you?

Address: BRANDENBURG & COMPANY, Factory Reps.
55th & Broadway, New York
1112 S. Michigan Ave., Chicago 1411 Dime Bank Bldg., Detroit

THE BUDA COMPANY · HARVEY CHICAGO SUBURB ILLINOIS




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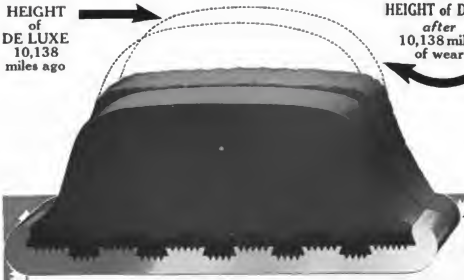


**A full-sized regular tire left after 10,138 miles!**

*Regular sized tires of different makes averaged only 7,000 miles in all!*

Thousands of miles still to be had after 10,138 Miles of Service! A typical example of DE LUXE MILEAGE on the big Pierce-Arrows operated by Spaulding & Spaulding of Buffalo.

Spaulding & Spaulding have tried all makes and all type of tires. They are now equipping their 17 trucks with DE LUXE tires—as rapidly as others wear out. DE LUXE tires are doubling their mileage.

What do your tires average? Why not take advantage of the experience of big truck operators, such as Spaulding & Spaulding, and get correspondingly increased mileage?

*Investigate now—write for "Upsetting Mileage Tradition"*

**GOODRICH "DE LUXE" WIRELESS TRUCK TIRES**

**THE B. F. GOODRICH CO.**

*Service Stations and Branches in All Principal Cities* — *World's Largest Rubber Factory Akron, Ohio*

# A TRUCK THAT PULLS THE LOAD

The above illustration shows a Duplex Four-Wheel Drive Two-Ton Truck performing an almost unbelievable feat. A flock of sheep which, together with the trailers, weighed over twenty tons, was hauled a distance of six miles over poor country roads. Due to the extremely rugged construction of the truck and its all-four-wheel traction, the run was accomplished without difficulty.

The Duplex is the peer of any truck built for strength and general efficiency. Made in two-ton and three-ton capacity. Fully covered by patents.

***We have an attractive dealers proposition. Get in touch with us immediately.***

**THE DUPLEX-POWER CAR COMPANY**

*Manufacturers of* — **Four Wheel Drive Trucks**

**CHARLOTTE, MICH.**




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*Do you have this Business?*

*Three-quarter ton Republic in service of Keil & Co., Chicago Dry Goods Merchants*

***Delivering your goods with Republic Trucks will be adding prestige to your business—and the greatest possible economy.***

# REPUBLIC MOTOR TRUCKS

Are built of the same clean appearance and have the same mechanical efficiency that characterizes your department store.

In operation they are capable of delivering as near 100% efficiency as it is possible to get in any delivery service. From the standpoint of economy, stability and good-will creation, the Republic is topped by no other form of transportation.

**Republic Low First Cost**

The very fact that the **leading** business houses, everywhere, have purchased, and are continuing to purchase Republic Motor Trucks in whole fleets at one time, is sufficient evidence of Republic quality. Discerning buyers appreciate the **honest value** represented in the Republic.

***Mechanically, there is no better truck*** —Yet the Republic has the **lowest first cost** of any other mode of delivery with the same capacity.

**The Right Truck for the Right Problem**

Republic trucks are built in several sizes: Three-quarter ton, One ton, Two ton and Three ton.

Each maintains Republic standards. Each are of the same general design. And each are fitted for certain work and to meet certain requirements in the dry goods business.

**Republic low first cost and exceptional adaptability has assisted more than 1,000 business houses in the U. S. to economically solve their transportation problems.**

It incurs no obligation on your part to investigate the wide adaptability of the Republic in the dry goods field and you will be profiting by receiving our suggestions for your business.

If you will write, your inquiry will have prompt attention.

**Sold in 200 cities throughout the U. S.**

**Name and address of nearest dealer upon request**

**DEALERS**

**The Dry Goods trade is only one of 200 in which Republic Motor Trucks are enjoying a vast sale.**
**A Republic contract will increase your profits and build for you an enviable reputation.**
**WRITE US ABOUT IT, TODAY.**

REPUBLIC FOR SERVICE
**REPUBLIC MOTOR TRUCK CO.**
ALMA, MICH.



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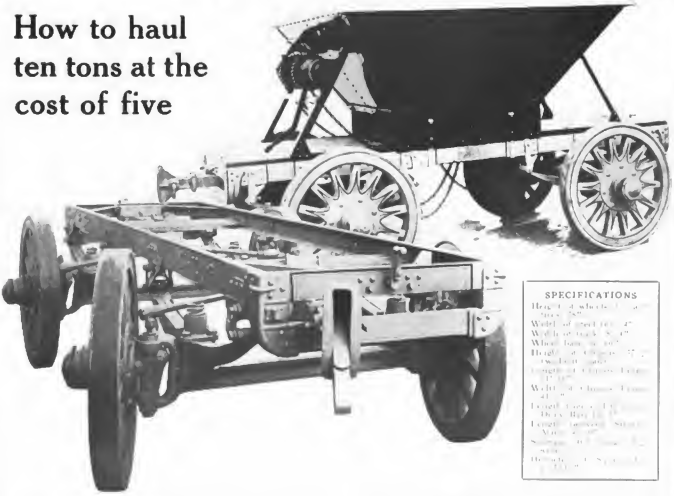
# Troy Trailers

## How to haul ten tons at the cost of five



SPECIFICATIONS

Suppose you are using a five-ton truck—the make doesn't matter.

To deliver five tons with that truck you have a fixed operating expense. So much for chauffeur—so much for gasoline—and so forth.

Now, without increasing this five-ton fixed operating expense—without adding one penny to it—you can deliver TEN TONS.

HOW? With a TROY TRUCK TRAILER

The only cost is the first cost of the Trailer—an investment which the savings of this unit quickly offset.

The saving resulting from doubling the truck load capacity without increasing operating expense.

The saving resulting from having a separate unit that leaves the truck free when increased capacity is not necessary.

TROY TRAILERS are built in 1½, 2½ and 5-ton models. Can be furnished with either dump or platform bodies.

Think this over—especially you who have long hauls at high speed. Write. Demand that we make a report on your conditions.

**Get Catalog 4CV**

## THE TROY WAGON WORKS COMPANY

**TROY, MIAMI COUNTY, OHIO**

| New York | Washington, D. C. | Detroit | St. Paul |
|---|---|---|---|
| No. 50 Church Street | 505 Riggs Building | 113 First Street | 331 American Nat'l Bank Bldg. |



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# Why SHELDON worm gear axles live up to the fullest possibilities of the worm gear type of drive.

¶ There is just one reason, fundamentally, that Sheldon Worm Gear rear axles under actual working tests show from 94% to 97% efficiency—that is 94% to 97% of power generated ultimately delivered to the rear wheels at road contact.

¶ That reason is, that

**SHELDON**

**WORM GEAR AXLES**

are designed and built solely with the idea of delivering greatest efficiency.

¶ Because we know from every conceivable test that ball bearings alone will properly care for the worm thrust load we use ball bearings for that purpose. Because we know, beyond any question, that the semi-floating type of axle is the superior of any other type we use semi-floating.

¶ Because we have designed these axles looking only to efficiency.

¶ And, because we build to that design with the sole idea of quality and results only, we are able to show the ultimate consumer economy both in original purchase as well as in operation.

¶ This in spite of the fact that Sheldon axles originally cost more than others.

## THE SHELDON AXLE AND SPRING COMPANY

Makers of Springs and Axles for More than 50 Years

WILKES-BARRE Chicago: 122 S. Michigan Blvd. Detroit: 1215 Woodward Ave. San Francisco: 444 Market St. PENNSYLVANIA

Exhibiting Section 16, Transportation Building, Panama-Pacific Exposition, San Francisco




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# Detroit Springs Take Rough Roads Like a Boat Takes Long Swells

DOWN and up in one long, graceful sweep—no rickety-bang-bang bump—Detroit Springs iron the wrinkles out of the roughest road, keeping the BODY of your truck on an almost perfect plane no matter what curves the WHEELS may negotiate.

# DETROIT SPRINGS

equalize the jars and jolts, assuming the entire burden and stubbornly defending the vital parts of the truck. Every Detroit Spring is *preconceived* with the basic idea of particularly serving the particular truck for which it is particularly designed. There is no such thing as a *stock* spring bearing the Detroit trademark. Every Detroit Spring is guaranteed in writing for two years, and adjustments will be made *on that basis* without question or quibble. Insure the dividends on your truck investment by specifying Detroit Springs. Write today for the pedigree—"From the Ore to the Motor Car"—the book that tells how and why "Detroit" are *the* springs for YOU.

**Detroit Steel Products Co.**
**2260 East Grand Boulevard**
**DETROIT, MICH.**

RESILIENT Detroit Springs SILENT—SELF-LUBRICATING

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Illustration from untouched photograph. Note finish.

# Worm Drive ½ Ton Model

*Electric Starting and Lighting*

*Built like a truck for continual service.*

# Department Store Delivery Fleets

We are in a position to furnish you **not only** light delivery cars of exceptionally good appearance—light weight—truck frame and spring suspension—designed and built for years of economical service—**but also** larger capacities and models for your heavy truck work—freight, furniture, warehouse, etc.

# LIPPARD-STEWART

**Capacities:—½ Ton, ¾ Ton, 1 Ton, 1½ Ton, 2 Ton Worm Drive**

**Some Dept. Store Users**

Buffalo—Adam Meldrum & Anderson Co.
Cincinnati—Joslin-Schmidt Co.
Nashville, Tenn.—M. M. Newcomer.
New York City—Best & Co.
New York City—Bonwit, Teller & Co.
New York City—Stern Bros.
New York City—Rogers Peet Co.
Pittsburg—Frank & Seder.
Portland, Ore.—Meier & Frank.
Portland, Ore.—Olds, Wortman & King.
Reading, Pa.—C. K. Whitner Co.
Rochester—Sibley, Lindsay & Curr.
San Francisco—Hale Bros.
Seattle—Bon Marche Stores.
Sioux City, Ia.—T. S. Martin Co.
Trenton, N. J.—S. P. Dunham Co.
Vancouver—Gordon Drysdale Co., Ltd.

Lippard-Stewart Style and Appearance will help your business.

Lippard-Stewart selection of material and standard of workmanship gives you great economy not only in durability of car, but in upkeep and operating expense.

It takes a very bad driver to lay a Lippard-Stewart up for repairs.

Tell us your Delivery Problem and
let us help you solve it for all time.

***Literature on Request***

Lippard-Stewart MOTOR TRUCKS
½ Ton, ¾ Ton, 1 Ton, 1½ Tons, 2 Tons

Radiator at Dash Our Dealers' Sign

## LIPPARD-STEWART MOTOR CAR CO.

**238 West Utica Street, Buffalo, N. Y.**

Chicago—Ropp Motor Co.
Lewiston, Me.—Wade & Dunton Carriage Co.
Pittsburgh—Vulcan Motor Truck & Service Co.
Cleveland—Albaugh Motor Sales Co.
Springfield, Mass.—Baxter & Duckworth Co.
Boston (Cambridge)—A. W. Cox & Co.
Richmond, Va.—T. D. Raney
Racine, Wis.—W. R. Taylor Motor Co.
Philadelphia—S. Bruce Somervell

***Live Dealers Should Get Our Proposition***



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# *We wonder how many others can profit—Read:*

Subscription Department,
Commercial Vehicle,
New York City.

Gentlemen:—

Some time ago one of the automobile firms sent me a re-print of some corking good articles which appeared in your magazine. I have tried all over town to find it for sale—but was not able to locate a dealer. Will you please enter my subscription for a year and bill me in the regular way. (Don't know the subscription price.)

Above all though—please mail me the back numbers in which the Model Garage of the Kaufmann & Baer Store in Pittsburgh is described. I think it must be in the 1st of October number of 1914—send all numbers containing part of this article, so that I have the complete write up.—I have the re-print of Aug. 15th-Sept. 1st-Sept. 15th—1914, in which the observations of the Kaufmann Delivery System are described. I would not take ten dollars for the statistics contained therein. I am anxious to read the description of the Garage.

For your information wish to say that I am the Efficiency Engineer for the largest Department Store here in town. Please mail the back numbers and the Magazine subscription to 1321 West 30th St., Los Angeles, Calif. DO NOT DELAY THE back numbers. Check will be mailed promptly.

Very truly yours,
PAUL VON KOENITZ,
With J. W. Robinson Co.

August the 25th, 1915.
Los Angeles, Calif.



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# A *New* Car

# THE BESSEMER

## Announce an Internal Gear 1-Ton Truck at

# $975.00

Continental Motor

Ross Steering Gear

Bosch Magneto

Torbensen Internal Gear Rear Axle

***Deliveries November 1st***

The complete line of trucks as follows:

| | |
|---|---|
| Model "G" 1-ton Internal Gear - - - - - - | $ 975.00 |
| Model "A" 1½-ton Chain - - - - - - - | 1800.00 |
| Model "D" 2-ton Worm - - - - - - - - | 2000.00 |
| Model "E" 3½-ton Worm - - - - - - - | 2800.00 |

***Write for our Dealers Proposition***

## Bessemer Motor Truck Co.

**Grove City** **Pennsylvania**




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COVERT

TRANSMISSIONS

The name COVERT is an assurance of service and satisfaction. It stands for quality. It represents efficiency. It signifies simplicity of construction. It assures durability. It indicates the greatest transmission value. It means economy in assembling and of operation. It's the name that will help sell your product.

We make transmissions for all types of pleasure cars and trucks. Consult our engineers concerning your requirements.

COVERT MOTOR VEHICLE COMPANY
FACTORY, LOCKPORT, N.Y. SALES OFFICE, DETROIT, MICH.



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# Where is Your Truck Now?

In an emergency do you feel confident its driver could stop it, save himself, save the car, save the load it carries? But are you **sure** he could?

**Thermoid**
**HYDRAULIC COMPRESSED**
**Brake Lining - 100%**

is **brake lining** all the way through. When the brake on your truck is equipped with Thermoid brake lining you have the best there is—and you want nothing less.

No man who has requirements for a truck can afford to have that truck taken from its garage without **knowing** its driver can stop it with the same certainty that he can start it.

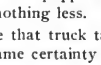
And you were very careful to know about its starting efficiency, weren't you?

Sometimes the stopping is much more important than the starting.

Get Thermoid Lining in the brake of that truck of yours—increase its efficiency, decrease its chances for a smash-up.

Manufacturers who use Thermoid afford safety, efficiency and minimum operating expenses to owners of their trucks.

Thermoid is a motor accessory staple—made so by the insistent demand of truck owners who know and trust Thermoid.




**Cannot be burned out nor affected by oil, heat, water, gasoline, dirt.**

**Our 7-word Guarantee**

Thermoid will make good, or **we** will.

**Thermoid Rubber Company**

**Trenton, N. J.**

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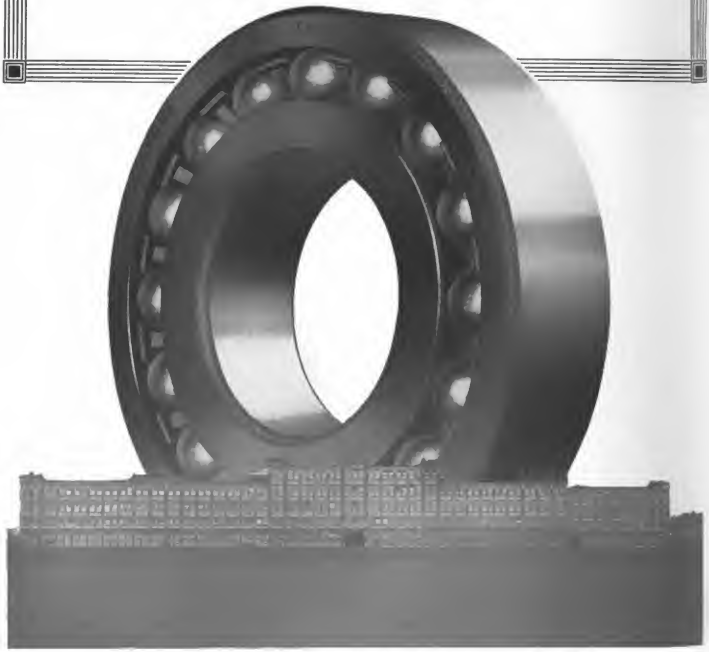
# Facilities Make SKF Possible

The SKF factory is one of the largest and best equipped Ball Bearing concerns in the world—and in the extent of its capabilities and resources—second to none.

With the famous Central Swedish and the Dannamora mines as its source of raw materials—with the skill and precision characteristic of the mechanical guild of northern Europe to call upon—and with a manufacturing plant designed and equipped especially for the production of high grade ball bearings—SKF makes its bid and sustains its qualifications for American patronage on the basis of superior design, good quality in both materials and workmanship and its ability to maintain these factors along with a regular schedule of deliveries.

**SKF BALL BEARING CO.**

**50 Church Street New York, N. Y.**



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# The Shortest Route

Draw a straight line from one point to another and you have the shortest route, **by distance.** Adopt a motor truck of proven efficiency and you have the shortest route **by hours.** Every time the minute hand on your office clock passes the hour mark, you have either gained or lost distance—minutes—hours.

# Chase Motor Trucks

Over 5,000 Chase Motor Trucks are faithfully serving transportation superintendents in every country of the world. When, over nine years ago, the first Chase truck pulled away from the factory, hauling needs took its most decided step forward.

Since that day Chase on the radiator means the culmination of every advantage that has been gained in commercial car development.

**Water-Cooled** **Worm Drive**
**Extra Heavy Frame** **Unit Power Plant**

1500 lbs. to 7000 lbs., $1500 to $3300.
Write today for literature.

## Chase Motor Truck Co.

**102 West Street** **Syracuse, N. Y.**

CHASE

Chase Your Delivery




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Exterior View New Departure Single Row

*The* Utmost service in motor transportation is found in the truck whose power is never wasted in overcoming friction in its working parts.

***In Commercial Vehicles Great or Small—***

**NEW DEPARTURE BALL BEARINGS**

**American Made for American Trade**

have stood every test for strength, durability and economy. Their use in such vehicles insures the utmost in motor transportation.

***Catalog Gladly Sent On Request***

**THE NEW DEPARTURE MANUFACTURING CO.**

Distributors in Trade Centers Throughout the United States

Conrad Patent Licensee

Bristol, Conn., U. S. A.

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# —Another FEDERAL Endorsement

F. T. Rooks, Vice Pres.,
U. S. Mill Supply Company,
Providence, R. I.,
Federal Distributors.

**THE U. S. MILL SUPPLY COMPANY**

MANUFACTURERS, IMPORTERS & DEALERS IN

MILL SUPPLIES, POWER TRANSMISSION,
OILS, GREASES, YARNS, WASTE, ETC.

MAIN OFFICE
PROVIDENCE, R. I.
BRANCH OFFICES
BOSTON, MASS.
PHILADELPHIA, PA.

MOTOR TRUCK DEPT.

Prov. R. I., Aug. 18, 1915.

Federal Motor Truck Co.,
Detroit, Michigan.

Gentlemen.-

Being desirous of adding 1½, 2 and 3½ ton Trucks to our line for Providence, Boston and vicinity, writer went into the different makes of motor trucks very carefully with one of the Country's most clever engineers and after calling on a large number of truck owners both in the East and Middle West, decided that Federal Trucks would prove the most satisfactory of any truck made in the country.

In calling on the owners we not only found Federal Truck users thoroughly satisfied with the amount of work which their trucks were doing, but what seemed of great importance to us was the low cost of operating and upkeep.

We are greatly pleased with the results which are being obtained with the Federal in this territory.

Yours very truly,

F. T. Rooks

Vice-Prest.

Dist. to G- F.T.R.

The more thoroughly that Federal Organization, Service and Products are investigated, the stronger becomes the confidence of the investigators that Federal Transportation is the most satisfactory.

As Mr. Rooks says, "In calling on owners we not only found Federal Truck users thoroughly satisfied with the amount of work which these trucks were doing, but what seemed of great importance to us was the low cost of operating and upkeep.

This is why we can say with the utmost confidence that—"Investigation Leads to Federalization."

The National Oil Company Federal shown here is evidence of our "fit it to your business" policy.

**Investigate the Federal Proposition**

**FEDERAL**
**Motor Truck Company**
**122-130 Leavitt Street, Detroit, Mich.**



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# Fedders Quality

THE Fedders Policy of building radiators to the design of the manufacturer who insists upon carrying out his own ideas in every detail of equipment does not interfere with his getting Fedders Quality.

The uninterrupted patronage of the finest American truck builders and the remarkable consistency of Stutz cars in speed contests proves that Fedders Quality is a constant —a good basis to figure on, whatever the problem to be solved.

Fedders Manufacturing Co., Inc.
Buffalo - - - - New York

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## Four-Wheel Drive Specifications

Wheelbase—3 ton, 122 inches; 6-ton, 140 inches.

Steering—Motor power (operated by hand lever) on all wheels giving positive action to a powerful, sure, fool-proof steering device which makes a remarkably short-turning radius.

Axles—Special patented full floating. Bearings—Rhineland.

Motor—3 tons, 4¾ x 6¾ Waukesha, 5½ x 7 Morton.

Transmission — Morton Selective 4 speeds forward, 1 reverse. Double worm drive to all wheels.

## Morton Worm Drive Specifications

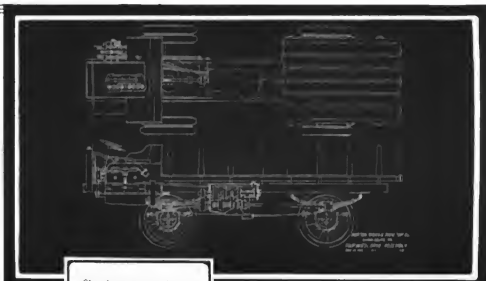
Motor—Continental—4 cyl.—4 cycle.

Carburetor—Carter.

Ignition—Bosch.

Lubrication — Positive plunger pump with constant level.

Centrifugal water pump. Hele-Shaw clutch. Selective transmission. Lever control. Right hand drive. Solid forged axles. Worm-Wheel of special phosphor bronze. All other equipment equally reliable.



Showing the equal power distribution of the Morton Four-Wheel Drive assembly

# MORTON

Four-Wheel Drive equally distributes the propelling strain over the four axles giving the highest efficiency because every pound of energy is turned into a distributed tractive effort. Morton Four-Wheel Drive Trucks in 3 to 6 ton capacity, are built to withstand the hardest usage and to mount the heaviest grades.

**Morton Worm Drive Trucks**

**1½—2—2½—3½—5 Tons**

Are the perfect vehicles of the light truck field.

## Extra Money For You

Aside from the regular truck business you can increase your earnings and the efficiency of your local fire department by interesting town officials in the finest combination hose and chemical wagon ever built.

Designed by capable engineers who provided every conceivable means for making this a dependable fire fighting unit that will get to a fire, regardless of the road it has to travel. The Morton Hose and Chemical Wagon is built of the best material, by the most skilled mechanics obtainable.

Electric starting, lighting and ignition systems are installed in such manner as to make failure to operate an impossibility. Simplicity is the keynote throughout.

Motor—Continental—6 cylinder four cycle, water cooled, 4⅛ x 5¼—60 H. P. of the unit power plant type. Starting and Lighting—Jesco Combined Starting and Lighting Systems. Carburetor—Carter. Drive—Worm Gear. Brakes—service and emergency on rear wheels. Steering Gear—Irreversible type.

Guaranteed against defective workmanship or material for one year.

Equipment—2 35-gal. chemical tanks connected with by-pass, 200 ft. of ¾-in. chemical hose, 1 extension truss ladder, 1 solid side roof ladder, 2 axes, 2 bars, 8-ft. pole, 2 3-gal. hand extinguishers, acid receptacle, plug for nozzle and all tools for operating tanks and devices.

Morton Truck and Tractor Company's combination hose and chemical wagon

*Dealers—Communicate for Open Territory*

**Morton Truck & Tractor Company**

Harrisburg Pennsylvania



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# The Safest Investment You Can Make

in handling the transportation and delivery of your merchandise is an equipment of trucks which not only are able to work all day each working day in the year, but which do so at the lowest possible cost for fuel—maintenance and repair.

## The Krebs

Automatically Governed Truck is mechanically self-sufficient. Its Continental Power Plant, driving the most modern form of worm drive rear axle, produces the exact amount of power required for the road conditions the vehicle encounters—the production of power being governed by an automatic control—the speed being regulated to safe and sane limits by the same device.

In a word, the KREBS Truck thinks for itself, leaving the driver no mental burden but stopping — starting — steering — and his work of making the deliveries.

See the KREBS before you buy any other. In the meantime get familiar with the economic advantages of the KREBS Governor—it is the most practical advance in the development of automatic transportation facilities.

The KREBS Truck takes care of itself. Its driver takes care of the deliveries.



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# More than a Half-Million Dollars Has Been Invested by the Great Department Stores of America in

# Packard MOTOR TRUCKS

THE LIST OF PACKARD USERS in this field is an honest index to the really representative merchants of this country. It contains the names of those big men whose "lengthened shadows" are great business institutions.

The house of Marshall Field & Company of Chicago, for instance, owns and operates thirty-two Packard trucks. Seventeen Packards are in the service of John Wanamaker, in New York and Philadelphia. Frederick Loeser & Company, of Brooklyn, employ thirteen Packards. Kaufmann Brothers, of Pittsburg, also operate a fleet of Packards numbering thirteen. Stix, Baer & Fuller Company, of St. Louis, bought their first Packard four years ago, and have added five since.

In thirty-three American cities, Packard trucks are serving the most progressive department stores. The total investment in Packard trucks in this service is more than $520,000.

The judgment of men who have built successful businesses is a trustworthy guide in the purchase of delivery equipment. They did not go about their selections blindly. They weighed and tested and analyzed all the conditions and costs before coming to a decision. They determined first that motor delivery was swifter, more economical and more serviceable.

They considered the possible business increase that would accrue through the extension of their radius of trade into territory then inaccessible.




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They appreciated the worth of increased prestige and the advertising value of truck equipment.

They studied the advantages of the truck in the matter of cleanliness, space economy, the ability to work in any weather, twenty-four hours a day if necessary; and the fewer helpers required in their care.

Most of all, they clearly saw the business profit in extending to customers a modern, punctual delivery service, regular and dependable.

In the purchase of such equipment as would assure this service, the same exhaustive and comprehensive calculation was brought to bear.

And they chose Packards.

The same qualities of service, economy and durability as prompted the selection of Packards in these instances, are embodied in all units in the Packard line, and a further advantage is found in the variety of units.

Packard New Type Chainless Trucks are built in seven sizes, of 1, 1½, 2, 3, 4, 5 and 6 tons capacity, respectively, all uniform in design—the only complete line of silent, chainless motor trucks in the world.

They may be had in optional chassis lengths and speeds, to suit the work in hand, and any chassis may be fitted with any type of body.

They are designed to give maximum service at minimum cost. By the use of demountable bodies, which may be loaded at the store while the truck is covering a route, a constant, expeditious delivery system may be maintained at all times. Any merchant can realize the value of such a system, especially in the rush periods of the year, at holiday time most of all.

The service qualities of Packard trucks are supported by the Packard service organization, available in all parts of America. *Send for a catalog.*

**PACKARD MOTOR CAR COMPANY, Detroit**

***Ask the Man Who Owns One***

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# "The Spring Is the Thing"

## MATHER

Scientifically Heat-Treated

## SPRINGS

designed to insure

## Maximum of Elasticity and Endurance

with

## Minimum of Vibration

Genuine made only by

## The Mather Spring Company

Toledo, Ohio




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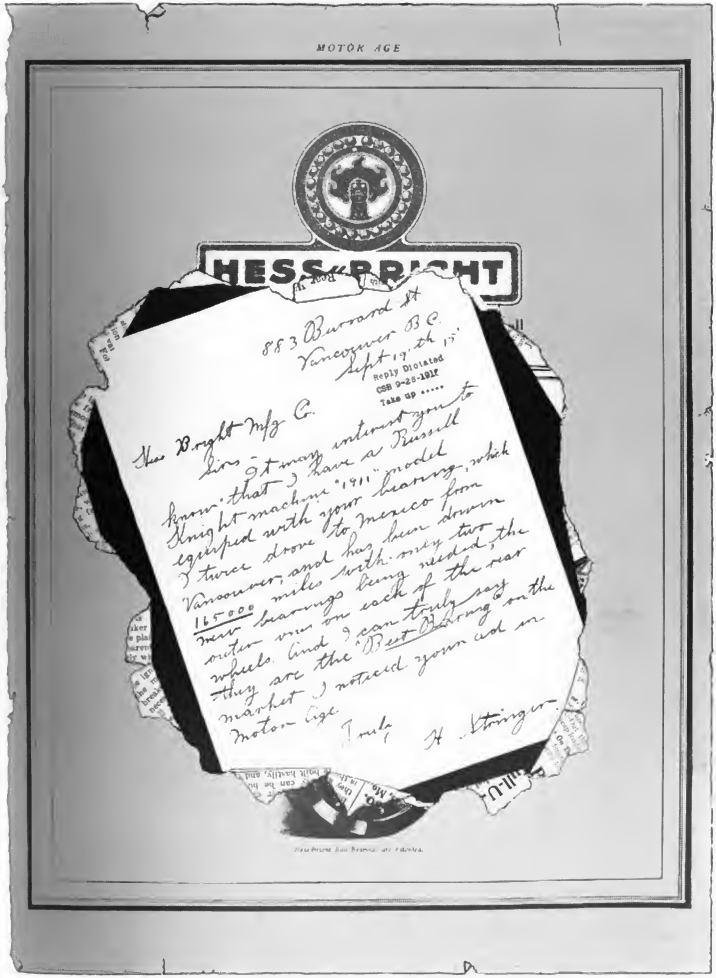


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¶ That reason is, that

**SHELDON**

**WORM GEAR AXLES**

are designed and built solely with the idea of delivering greatest efficiency.

¶ Because we know from every conceivable test that ball bearings alone will properly care for the worm thrust load we use ball bearings for that purpose. Because we know, beyond any question, that the semi-floating type of axle is the superior of any other type we use semi-floating.

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## THE SHELDON AXLE AND SPRING COMPANY

Makers of Springs and Axles for More than 50 Years

WILKES-BARRE — Chicago: 122 S. Michigan Blvd. — Detroit: 1215 Woodward Ave. — San Francisco: 444 Market St. — PENNSYLVANIA

Exhibiting Section 16, Transportation Building, Panama-Pacific Exposition, San Francisco




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The COMMERCIAL VEHICLE

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Other Countries in Postal Union.....One Year $3.00

Advertisements

Changes in copy for advertisements in the next issue to be in the office of publication not later than 10 days before date of publication.

# On the Way

There has been a development in mechanical haulage which has caused widespread discussion and has revolutionized certain classes of heavy haulage work, both as to means and methods.

This development is the rise of trailers.

In the next issue of

The COMMERCIAL VEHICLE

will be published the most complete analysis of the trailer movement, its history, causes and far-reaching effects ever attempted.

It will be followed in later issues by a description of all types of trailers for motor trucks now on the market.

If you do hauling in lots of over 3 tons, you cannot afford not to be informed on this subject. If you haul smaller amounts there is a side of the matter that merits your attention also.

## Don't Fail To Read It

If you are not a regular subscriber, you had better become one right away so that you will not miss it.

The COMMERCIAL VEHICLE

READ BY BUSINESS MEN

239 West Thirty-ninth Street
New York City



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John Wanamaker Owns 121 Autocars

**No Sir! Our Horses Are Not Going to War**

We have only 208 now! One after the other of 288 of our horses in New York and Philadelphia have had to go to other employments, being superseded by our more rapid automobiles and trucks.

We cannot consent for the faithful dumb beasts in our stables to be packed in a ship and transferred to a battlefield.

Having always approved the work of the Society for the Prevention of Cruelty to Animals we are constituting ourselves a society to keep these good old horses out of the wars.

The good old days of horses for work and pleasure are passing—

The four strong legs are giving way to the four swift wheels—

But our sixty passenger elevators are in a sense flying horses carrying at once a dozen persons or more and doing it all day long from the street floor to the upper floors instead of the old-fashioned climbing of the staircases which customers had to do formerly.

These are the better days for shopping and this store grows in its attractiveness and usefulness.

[*Signed*]

John Wanamaker

August 31, 1915

*From the John Wanamaker daily advertisement*

OVER his own name, the man who has blazed the way of efficiency in distributing merchandise calls the motor truck "The Four Swift Wheels" of commerce.

The Autocar has supplied "The Four Swift Wheels" to more than 2600 American business houses.

John Wanamaker is one of the country's merchants that pay tribute to the reliability and economy of the Autocar by using them in large fleets.

*Write for illustrated catalog and list of over 2600 concerns using Autocars in every line of business*

**Chassis Price, $1650**

***THE AUTOCAR COMPANY, ARDMORE, PA.***

***Established 1897*** ***MOTOR CAR DELIVERY SPECIALISTS***



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The COMMERCIAL VEHICLE
Read by Business Men

Vol. XIII October 15, 1915 No. 6

# Trucks Complete Chain of Transport Efficiency of Buffalo Mail-order Plant

## Larkin Co. Has Used Motors 15 Years
## Owns Thirteen Trucks
## Never Used Horses

By Merrill C. Horine

The Administration building at plant of the Larkin Co., at Buffalo, N. Y.

NO HORSES are used by the Larkin Co., Buffalo, N. Y. In 40 years of business this concern, which does an exclusive mail-order business on the premium basis, has never owned any horses. For 15 years it has used motor trucks and today has thirteen. It does the biggest business of any premium-mail-order house in the world, and inefficient slow transportation means have been eliminated. The volume of business done and the clubbing of buyers so that goods is shipped in carload lots makes it possible for nearly all the goods to be taken from and loaded into the freight cars in the terminal warehouse of the plant.

Economy thus effected is carried also to the minor movements of goods in the city of Buffalo by means of exclusive motor equipment.

The Larkin Co. is a mail-order house cataloging all manner of household necessities and specializing in soap and allied products. Its chief distinction from other mail-order firms is in its extensive premium business. This branch of the industry is a form of profit-sharing, by which purchasers of Larkin products are given articles of furniture and household goods as their share of the saving of middlemen's profits. These articles are in some cases manufactured by the Larkin Co.

It operates a plant having 64 acres of floor space, in which 2,500 persons are employed. It is the largest concern in the world operating on the mail-order-premium plan. The concern dates back to 1875, and for 15 years has been a user of motor trucks. Since the first truck was bought, a Waverley electric, the concern has never been without them. As they wore out they were junked or traded in and replaced with new ones. The oldest now in service is

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One of the 2-ton Lippard-Stewart trucks taking a load of outbound freight at the terminal warehouse for shipment by freight

a rebuilt Couple-Gear electric 5-tonner, which is 8 years old. It is estimated to be good for 8 years more.

The present fleet of motor trucks consists of the following:

| | | |
|---|---|---|
| Three | 5 -ton | Couple-Gear electrics |
| One | 5 -ton | Pierce-Arrow gasoline |
| Five | 2 -ton | Lippard-Stewart gasoline |
| One | 1½-ton | Lippard-Stewart gasoline |
| Two | ¾-ton | Lippard-Stewart gasoline |
| One | ¾-ton | Peerless rebuilt touring car |

a total of thirteen vehicles. It has previously been the custom of the Larkin Co. to rent horse vehicles for such trucking as is necessary, but at present these are practically never resorted to. It is a curious fact that the Larkin Co., while it is 40 years old and owns and operates a fleet of motor trucks, has never owned any horses, but always preferred to rent them at a flat rate, so as to be assured of service at a fixed cost. A possible explanation of this is that motor trucks have been found more reliable than horses, both as concerns service and cost.

### Trucks Accessory to Transport Scheme

The transportation system of the Larkin factory is immense and complicated, seeing that it serves six groups of buildings, mostly eight or more stories high. The greater part of the goods received and shipped is handled directly into and out of the cars, a railroad terminal building ten stories high being devoted to receiving and shipping alone, so that the motor trucks constitute but a small portion of the general transport scheme.

Some freight, however, is received in less-carload lots. Some deliveries are made in Buffalo itself, and a great deal of goods has to be transferred between different factory buildings and the warehouses. A large post office branch is located close to the terminal warehouse to handle the parcel post shipments. The first class mail, both incoming and outbound assumes gigantic proportions. There is paper to be brought to the plant for the wrapping of the millions of orders and the publication of the vast amount of printed advertising matter required, and to serve the restaurants and lunch rooms maintained by the company, transportation has to be provided.

These and other odd jobs are assigned to the motor vehicles. They operate only within a 5-mile radius of the plant.

To obtain the heaviest incoming mail the rebuilt Peerless makes the first trip from the Buffalo post office to the administration building of the plant with first class mail in the morning. It is equipped to accommodate a stretcher, so that in case of an accident it may be transformed into a fleet private ambulance.

For this and miscellaneous emergency work the vehicle is held at the garage. A Ford runabout continues the first class mail work, making trips hourly between the post office and the plant.

City deliveries occupy the entire time of one of the 1,500-pound Lippard-Stewarts, the other being used for the transfer of office laundry, milk and restaurant supplies, outbound express packages and odd jobs of trucking. The second ¾-tonner also helps some with the city deliveries.

### What the Trucks Do

The time of the 1½-ton Lippard-Stewart truck is entirely consumed in picking up miscellaneous inbound shipments via rail and damaged shipments, goods of both classes being deposited at the main freight terminals of the railroads.

The 2-ton Lippard-Stewarts are assigned to regular city delivery routes and also fill in with outbound l.c.l. freight orders which must be delivered at the freight terminals for shipment. Such incoming l.c.l. freight as occasionally comes to the Larkin Co. is picked up by these vehicles, but it amounts to very little, as most of the material received by the plant is purchased in carload lots.

Paper, heavy l.c.l. shipments and long-haul city deliveries are handed over to the big Pierce-Arrow 5-tonner. The 5-ton Couple-Gear electrics are used for the transfer of material between buildings. They are also used in connection with a trailer for the hauling of refuse and waste products of the manufacturing plants.

It will be noted that all of the commercial vehicles used by the Larkin company are on truck chassis with the exception of the Peerless, and that there is a considerable variance in load capacity of the different vehicles. The first is a measure of economy, the Peerless being a rebuilt chassis formerly used by one of the directors of the company as his private conveyance.

Just before it was installed, an old Model 14 Peerless was junked after 10

The 5-ton Pierce-Arrow truck which does the heaviest trucking of any of the vehicles

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Most of the Larkin vehicles lined up in front of one of the many factory buildings in the Larkin plant. They comprise Lippard-Stewarts, a Peerless, Couple-Gear electrics, a Pierce-Arrow and Fords

years of service, having been bought new in 1905 by one of the directors, used as a passenger car for 4 or 5 years, and then remodeled into a commercial vehicle.

### Divers Services Require Mixed Fleet

The reason for the diversity of sizes is found in the diversity of uses to which the vehicles are put. The vehicles are selected for their maximum loads. The two smaller Lippard-Stewarts and the Peerless are used in work where the loads are light, but in which speed is a prime requisite. Accordingly they are of light capacity and mounted on pneumatics.

The 1½-tonner is used in work requiring a heavier chassis than a ¾-ton size, but yet lighter than required for the l.c.l. freight stuff which is trucked on the 2-tonners. The paper loads hauled by the Pierce-Arrow are heavy and its great capacity is needed to accommodate the occasional loads of l.c.l. freight which are too heavy for the 2-tonners.

Most of the hauls are short, the freight terminals being all within a mile of the plant, some only ½ mile away. It is very seldom that any truck exceeds 55 miles per day. The 2-tonners average between 30 and 40 miles per day and are probably the most efficient of any in the fleet for this reason. The Couple-Gears do not run much over 11 miles per day and the Pierce-Arrow makes but 15, on an average. Most of the hauls are arranged for two-way loads, however, so that in view of the low mileages the ton-mile product would probably be surprising.

The mileages of the lighter vehicles are proportionately higher than of the heavier ones, so these are probably quite profitably employed.

The Pierce-Arrow is perhaps used the least efficiently of any of the vehicles. This is because it is used more as a platform for the storage of goods than as a vehicle. It makes between 12 and 15 miles a day of 9 hours when it might easily triple or quadruple this mileage, since such a daily travel represents an average speed of only 1.9 miles an hour. As the truck probably averages 8 miles per hour actual running speed, it is evident that it is actually moving but 1.875 hour per day and that it stands idle 7.125 hours daily.

Its cost is placed at $12.60 per day, or $1.26 per working hour. This would seem low were the amount of work anything near standard, but considered from a mileage standpoint it is exceedingly high—84 cents per mile.

### Novel Depreciation Formula

Unquestionably, however, the truck will last much longer than its allotted life of 5 years, due to the small amount of use it gets and the excellent care it gets, so that a 20 per cent depreciation, as usually charged, would be too high. The Larkin company charges 33⅓ per cent depreciation on the book value of the truck, or 33⅓ per cent of the cost the first year, 33⅓ per cent of the remaining 66⅔ per cent the second year and so on for five years, at the end of which time the value is placed at about 13 2/9 per cent. To carry this last figure over a period of 5 more years would be so small a burden that besides the overhead represented by the driver's salary, the idleness of the truck would cut little figure. As the driver, during the time the truck stands idle, is presumably occupied with useful work of some sort, such as loading and unloading, this loss, too, would be minimized to some extent.

The decreasing schedule of depreciation from year to year over a period of 5 pears is intended to equalize the increasing cost of maintenance and upkeep from year to year. Should the truck be rebuilt after 5 or more years of use, the cost of rebuilding would be added to the inventory value and the plan of depreciation of 33⅓ per cent of value at the last January 1 would be continued. The cost of annual repairs is charged to maintenance and does not increase the inventory value.

### 5-Tonner Needs More Work

In view of all this, the Larkin company need not look with too great alarm upon the unquestionable inefficiency of the truck in its present application, but if it is possible to find more work for it to do, the opportunity to convert a loss into a gain should not be overlooked.

The care which the trucks receive is in the hands of a capable garage superintendent in charge of a well-equipped garage. This garage has a capacity in excess of the requirements of the thirteen trucks and serves also to house the Ford runabouts used by city messengers and buyers and several of the private conveyances of officers of the concern.

A battery man has charge of the Couple-Gear trucks and they are charged in the garage. Ignition and starting batteries of the gasoline vehicles are also looked after by this same man. A vulcanizing plant for tubes is also maintained.

Overloads are against the rules and it is significant that the drivers now used have nearly all been in the company's employ for several years.

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## A Foretaste of the Future

A TASTE of conditions in the export field after the war was afforded by the simultaneous releasing of a number of important outputs of British commercial vehicle factories and the threatened 33 1/3 per cent protective tariff against imports of American motor vehicles into the United Kingdom.

American manufacturers have good reason to congratulate themselves over the eleventh-hour exemption of business vehicles from this tariff, which now applies on passenger cars, but the gravity of the situation, temporarily, at least, avoided, is no less acute.

War orders have been the principal cause for the astounding rise in motor truck exports in the past year, but the growth of commercial sales of American trucks in England has been of deeper significance in many ways and is the feature of American export business that merits the closest scrutiny.

It was British business men who had been deprived of their rolling stock and British motor dealers left without stock in trade, not American exporters whose representations caused the change in plan.

John Bull has bought American trucks and permitted them to be imported duty-free because it is to his own best interest to do so. He would have acted differently had his interest lain contrariwise.

Were American builders prepared for the blow that did not fall, but which may yet? Picture events as they would have been had the original plan been carried out:

War business and shipments would not have been affected by the British duties any more than they are by the 45 per cent duty imposed by France. What would the effect be on commercial sales? Should manufacturers have ceased shipping trucks abroad, or would buying on the other side have continued in spite of the higher prices which British buyers would have had to pay?

The released outputs of English and Scotch makers will not be sufficient to supply the deficiency of the supply of trucks for commercial purposes in the United Kingdom for two reasons:

1—Not enough trucks have been released from government appropriation to supply any considerable portion of the demand, nor will the full resources of the released factories be available for normal work because of the demands of the Ministry of Munitions for more factory facilities for shell-making.

2—Even if all the British factories could resume their business as it was early in 1914, the demand has grown to such proportions through the confiscation of private vehicles that all buyers could not secure deliveries within a year.

British buyers will still insist on having trucks. They will buy such English vehicles as are placed on sale and fill in with what they can get. There has been for some time a deficiency not only of British products, but of the imported article as well. Only those engaged on government contracts can secure such British chassis as are released.

It is high time that manufacturers and exporters looked sharp to their second lines of defense. The great drive of American competition is now receiving the first real resistance since the war began. Advance, yes; but see that the second line of intrenchments is in readiness should a retreat be necessary.

The second stage in this dollar war which we have been waging will be when American builders are forced to look again to home markets for absorption of the greater part of their production; when European competition will be more nearly a man's battle; and when truck makers in the United States make a belated effort to enter the South American, Asiatic, African and Australian markets which have been starved of trucks so long.

Only such an exporting manufacturer can feel safe as has his house in order.

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For the first time in the history of army maneuvers in this country, motor trucks transported an entire regiment on a complete march at the recent gathering of the National Guardsmen of New York City at Van Cortlandt Park. The whole Seventh Regiment was carried from the armory to the park in about seventy-five motor vehicles of which thirty-five were trucks. A G. M. C. and a Garford are shown arriving at the park in the above picture

# Trucks Carry Regiment

By Battlecar

## MOTORS TRANSPORT ENTIRE INFANTRY REGIMENT AT GOTHAM DRILL FOR FIRST TIME IN HISTORY OF ARMY MANEUVERS IN THIS COUNTRY

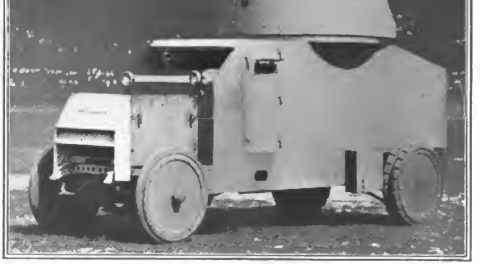
MOTOR TRUCKS transported an entire regiment on a complete march for the first time in the history of army maneuvers in this country at the recent 1-day encampment of the National Guard of New York, held at Van Cortlandt Park, New York City. Approximately 10,000 National Guardsmen took part in the maneuvers and all of these who were not mounted or did not belong to the cavalry or artillery divisions marched to the park from their respective armories except the Seventh Regiment of infantry, which was carried to the field exclusively in motor vehicles, of which thirty-five were motor trucks.

All of the trucks used for the purpose were voluntarily loaned to the regiment by truck owners and dealers in New York City and Brooklyn. Those who loaned vehicles included the Garford Motor Truck Co.; Lord & Taylor; J. F. Daniels Sons; R. H. Macy & Co.; Charles & Co.; Degnon Contracting Co.; Federal Motor Truck Co.; Trailer Transportation Co.; International Motor Co.; Public Service Commission; Loose-Wiles Biscuit Co.; American Bank Note Co.; Packard Motor Car Co.; W. & J. Sloane; Reo Motor Car Co.; Autocar Sales Co., and the Hotel Astor.

The vehicles were lined up at the Seventh Regiment armory at Sixty-seventh street and Park avenue at 9 a. m., and after being loaded with their human cargo made the run to the park, a distance of about 11 miles, in 45 minutes. Some of the Brooklyn regiments which had 15 to 25 miles to march on foot took several hours to reach the park. This enabled a direct comparison to be made with the motor trucks and proved conclusively the advantages of the motor truck equipment and its ability to cover ground quickly.

The three combat wagons of the regiment were towed by two of the trucks, the horses being led by mounted orderlies. Equipment for the machine-gun company and the necessary ammunition, as well as forage for the horses were also carried in the combat wagons. Two reserve trucks were assigned to each battalion as emergency vehicles in case of breakdowns.

After the maneuvers were completed, the regiment was taken back to the armory in the same vehicles. The return trip was made without delay, excepting in the third battalion, in which one truck became damaged but was replaced by the reserve truck with a delay of but 5 minutes, which did not interrupt the movement.



One of the armored trucks which took part in the maneuvers. A 1½-ton Federal chassis equipped with an armored body surmounted by a revolving turret carrying a rapid-fire gun. Note the steel disk wheels, the radiator protection and the armored driver's cab

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# Street Railways Now After Big Bus

## Think Small Jitney Bus Dead But Fear Large Ones

SAN FRANCISCO, CAL., Oct. 8—At the annual convention of the American Electric Railway Assn., held here October 4 to 8, the problems of the higher fare and longer haul motor bus were seriously considered.

The report of the Committee on Motor Vehicles presented at the convention restated the conclusion of the committee's earlier report that the jitney bus had its origin in general business conditions, and principally in unemployment, was economically unsound, and destined to failure. In 60 cities from which statistics are available there have been decreases ranging from 19 to 100 per cent. The immediate effect of regulation requiring a bond for safe operation is a decrease in the number of jitneys; but the main decrease is said to be due to economic causes, it was asserted.

Where some railway companies have tried the operation of jitneys they have found the business unprofitable, notwithstanding the efficient methods employed. In 112 cities regulatory ordinances are now in force, and are under consideration in fifteen others.

The association will continue a committee during the coming year, under recommendations that it study the legal phases of ordinances and state laws, compare rules of the state commissions, and study the procedure of state commissions in granting the right to operate.

The final and most important recommendation is that it begin at once an investigation of the modern motor bus, as distinguished from the jitney bus, as a feeder, auxiliary, and competitor of the electric railway. The association will print in the near future a compilation of various rulings regarding the jitney bus, for distribution to its members.

### SOUTH AMERICAN FINANCES

WASHINGTON, D. C., Oct. 5—"Financial Developments in South American Countries" is the title of a new publication just issued by the Bureau of Foreign and Domestic Commerce, which should be of great value to all those who are seeking to expand their trade in South America.

The booklet contains 40 pages and covers the situation as regards currency; the money market; the principal banks and the general condition of business in Argentina; Bolivia; Brazil; Chile; Peru and Uruguay during the last 2 or 3 years.

William H. Lough, vice-president of the Alexander Hamilton Institute, who has only recently returned from a trip through the countries treated, is the author of the book. It may be obtained from the superintendent of documents, government printing office, Washington, D. C., for 5 cents per copy.

### TEST TWO TRUCK FENDERS

NEW YORK CITY, Oct. 12—Two makes of fenders were tested by the Safety-First Society of New York City here this afternoon to determine if a fender for application to the front of a motor truck is capable of effectively preventing accidents. The two fenders tested were the Glasgow, described on page 33 of this issue, and the American. The former was attached to a passenger car and the latter to a 3-ton Atlantic electric truck owned by the Anheuser-Busch New York agency. The American fender is developed from street car designs used successfully in Portland, Ore.; Seattle, Wash.; Vancouver, B. C., and Boise, Idaho.

### UNCLE SAM'S GOOD ROAD WORK

WASHINGTON, D. C., Oct. 9—The Office of Public Roads and Rural Engineering of the United States Department of Agriculture has supervised the construction of forty object-lesson roads in twelve states during the period from July 1, 1913, to December 31, 1914, according to the reports issued in the departmental Bulletin No. 284. The federal highway engineers, upon application from local road authorities, have supervised the building of short stretches of various kinds of roads, as object lessons, and for the purpose of demonstrating the proper methods of construction adapted to the respective communities.

Except in the cases of special post roads, the counties through which the roads passed have paid the entire cost of materials and construction, the department supplying only the expert supervision.

The states in which the work was carried on are as follows: Arizona, Florida, Massachusetts, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia.

### PIKE'S PEAK CLIMB FOR TRUCKS

DENVER, COL., Oct. 8—A hill-climbing contest for motor trucks is planned by the Pike's Peak Highway Assn. in connection with contests for passenger cars over the Pike's Peak Highway, 17 miles long from Cascade at the foot to the summit. The suggestion was made by Stanley Wilson as a result of the success of the Wilson truck in negotiating this climb, as reported in THE COMMERCIAL VEHICLE of October 1.

### Coming Commercial Vehicle Events

| | |
|---|---|
| Oct. 6-16 | New York City, Electrical Exposition & Motor Show, Grand Central Palace. |
| Oct. 16-23 | Philadelphia, Pa., Show, Motor Square Garden. |
| Oct. 18-19 | Cleveland, O., Convention Electric Vehicle Assn. of America, Hotel Statler. |
| Oct. 19-20 | Detroit, Mich., Safety First Convention, Safety First Federation of America. |
| Oct. 20 | New York City, Monthly Meeting, Motor Truck Club of America, Automobile Club of America. |
| Oct. 21 | New York City, Met. Sec. S. A. E. Meeting, Automobile Club of America. |
| Oct. 29 | Indianapolis, Ind., Ind. Sec. S. A. E. Meeting, Claypool Hotel. |
| Nov. 29-Dec. 4 | Electrical Prosperity Week. |
| 1916 | |
| Jan. 8-15 | Cleveland, O., Show, Wigmore Coliseum. |
| Jan. 8-15 | Philadelphia, Pa., Show. |
| Jan. 29-Feb. 5 | Columbus, O., Motor Vehicle Show. |
| Jan. 29-Feb. 5 | Minneapolis, Minn., Motor Vehicle Show. |
| March 4-11 | Boston, Mass., Motor Vehicle Show, Mechanics' Hall. |

# Tire Plants Making Big Additions

## Goodrich, Goodyear and Swinehart Busy on Buildings

AKRON, O., Oct. 5—Announcements are made by the Goodyear and the Goodrich companies, that additions to their plants, to be started in the near future, will mean an expenditure of more than $1,000,000. These additions are necessary to take care of the rapidly increasing business of the concerns. There is no slack time in the tire manufacturing industry of the Rubber City.

The B. F. Goodrich Co. is excavating on Bartges street for a five-story building 800 by 270 feet, which will be the largest of any of the structures in the plant. A six-story building is also being erected on Falor street, on the site of the employment office. The structure on Bartges street will cost in the neighborhood of $800,000.

The Goodyear Tire & Rubber Co. will add an eight-story building 200 feet wide to its present uncompleted addition on East Market street.

The Swinehart Co. also contemplates the erection of a large addition to its plant.

### COMPLETED LINCOLN HIGHWAY OF MILITARY IMPORTANCE

NEW YORK CITY, Oct. 14—A completed Lincoln Highway would be of the greatest military importance to the United States in case of a foreign invasion of this country, because it would enable 138,000 troops to be transported from the east to the west coast in 2 weeks by the use of 30,000 motor trucks. The value of motor transport has been amply proven in the present European war. Its efficiency, however, is largely dependent upon the character of the route over which the vehicles operate.

Many of the good roads of the United States are unfortunately separated from each other by many miles of wretched country roads, and the good time made in traveling on the former is frequently neutralized by accident and delay superinduced by the latter. The completed Lincoln Highway will avoid this objection for the entire length of the travel zone which it will traverse and will therefore be of great value in the motor transportation of troops, ammunition, guns, camp equipage and supplies.

### B. & O. STARTS SAFETY CAMPAIGN

BALTIMORE, MD., Oct. 7—In an endeavor to decrease the number of accidents caused by motor vehicles coming in collision with trains at grade crossings, the Baltimore & Ohio railroad has started a campaign in which letters embodying suggestions for personal and property safety will be mailed periodically to motor vehicle owners. This method of making a personal appeal to the public was decided upon because of the alarming increase in such accidents during the past year, when twenty-nine motor vehicles were struck by trains, an increase of seventeen accidents and twenty-three deaths as compared with 1913.

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# Allied Motor Makers Plan Protection

## Would Prevent American Builders' Invasion of Market

PARIS, FRANCE, Sept. 24—The various motor vehicle manufacturers' associations of Europe have become united into a makers' union, from which Germany and Austria have been struck off. Neutral nations, including the United States and Switzerland, will be excluded and the membership practically confined to the manufacturers in the nations of the *Entente*. The purpose of this union is to arrange reciprocal tariffs between these nations and prohibitive import barriers against enemy and neutral countries. The French industry is taking a firm stand for protection against American invasion of its trade after the war by holding out for either reciprocal duties in both France and the United States or equally-protective tariffs in each.

### ENGLAND BUYS COUPLE-GEARS

GRAND RAPIDS, MICH., Oct. 4—Arrangements have been made for the production of eighty scout motor trucks by the Couple-Gear Freight Wheel Co., here, for Great Britain. These are to be similar to some which the company has supplied the U. S. government and are for searchlight and wireless work. They are of the gasoline-electric type, with four-wheel drive and steer, and will cost about $10,000 each.

### COUZENS LEAVES FORD

DETROIT, Oct. 12—Because Henry Ford has decided ideas on war and peace and finds a ready means of airing them in the public press and because James Couzens, his partner in business since the inception of the Ford motor car, differs in these matters, the latter has resigned his position of vice-president, treasurer and general manager of the largest motor vehicle plant in the world, remaining a director only.

Mr. Couzens first met Mr. Ford in 1902 and became interested in the building of a sample car. He helped Mr. Ford develop his business and in 1903 assisted in the organization of the present Ford Motor Co. He has been the financial and business spirit of the firm practically since its inception, Mr. Ford being the designing and construction head.

### N. Y. MOTOR RESERVE CORPS

NEW YORK CITY, Oct. 4—Owners of motor trucks will have an opportunity of joining a motor reserve corps to be formed here shortly in conformance with the statement by Secretary of War Garrison that such organizations would be welcome measures of defense. In the October number of *Motor Print* Secretary Garrison's statement was printed and the same magazine later received a letter of indorsement from Brigadier-General A. L. Mills, U. S. A., Chief of the division of Militia Affairs.

At a meeting to be held in one of the large New York armories within the next 2 weeks motorists will be invited to attend and pledge the services of their cars or trucks and themselves or their drivers. It is expected that in return for this such owners will be relieved of license fees, but will be penalized for failure to make good their pledges. A special insignia is proposed for members to carry on their cars.

### KNOX WON'T SELL PLANT

SPRINGFIELD, MASS., Oct. 14—The Knox Motors Co. has refused to sell its tractor plant to bidders who desire increased facilities for the production of munitions of war. The Bethlehem Steel Co., the New England Westinghouse Co. and the General Electric Co. made overtures without success. The Westinghouse interests have already secured the Stevens-Duryea plant at Chicopee Falls, Mass.

### S. A. E. IN CHICAGO

CHICAGO, Oct. 14—The Standards Committee of the Society of Automobile Engineers held its fall meeting here at the Chicago Automobile Club. A preliminary meeting was held yesterday and the regular session today.

Standardization of cone clutch housings, headlight glare reducers and reducing means, standard wire gauges and specifications for electric equipment and license plate holders was discussed and division reports received.

### BUCKEYES SEE TRACTORS

WAUSEON, O., Oct. 5—One of the features of the annual Fulton county fair, which was held at Wauseon last week, was a display of farm tractors. The exhibit was placed in the new agricultural building and attracted the attention of farmers generally.

### CAPITAL INCREASES

DETROIT, Oct. 14—At a meeting of stockholders of the Continental Motor & Mfg. Co. to be held October 19, the question of an increase of capital from the present $1,500,000 to a higher amount will be considered. At the same meeting a dividend will be declared on the stock. No official statement as to the amount of the dividend has been made but rumor has it at 100 per cent. At the end of the fiscal year last June the company had a surplus of $754,227.51. Its assets and liabilities were $3,075,388.97. An increase in business of 25 to 40 per cent is reported.

CLEVELAND, Oct. 11—A new charter for the Perfection Spring Co. has been applied for, under which it is to have a greatly increased capital. At present the capital stock consists of $500,000 7 per cent cumulative preferred and $1,000,000 common. It is proposed to increase this to $1,000,000 preferred and $1,500,000 common.

DETROIT, Oct. 2—The Detroit Commercial Car Co., which recently brought out the Detroit 1,000-pound package vehicle, has increased its capital stock from $1,000 to $100,000. It has leased part of the plant of the Pontiac Chassis Co., Pontiac, Mich., which is making chassis for the concern.

# August Truck Exports 1,614 Vehicles

## $4,387,193 Shipments Lower Than 4 Previous Months

WASHINGTON, D. C., Oct. 11—Motor truck exports in August, 1915, amounted to 1,614 vehicles, valued at $4,387,193. This was a falling off from the figures for the previous 4 months of the summer, but it was nearly twenty-four times as great as for the August previous, in which sixty-eight trucks valued at $124,016 were exported.

### ANOTHER SUPERIOR TRUCK

ATLANTA, GA., Oct. 8—The third motor truck on the American market with the name Superior has been announced by E. G. Willingham's Sons in this city. G. E. Whiteside, formerly with the E. R. Thomas Motor Co., the La Salle Niagara Auto Co. and the American Locomotive Co., is the chief engineer of the concern.

Two models will be built to start with, of 1- and 2-ton capacity. The first of these will be delivered by November 1. The trucks will be internal-gear-driven with valve-in-the-head motors having offset crankshafts and incorporating the Raybestos-faced multiple-disk clutches and three-speed selective gearsets in three-point-suspended unit power plants. The 1-tonner will cost $1,350, an express body costing $50 additional.

### COLUMBIA MOVES TO PONTIAC

PONTIAC, MICH., Oct. 2—The Columbia Motor Truck & Trailer Co., formerly the Kalamazoo Motor Truck Co., of Kalamazoo, Mich., has accepted the proposition made by the board of commerce of Pontiac to move its factory here. A 5-acre site will be purchased by the concern and the board will attend to the erection of a plant with a capacity for 300 trucks annually.

### TRUCK MEN LAUNCH TRACTOR

DETROIT, Oct. 11—The Standard-Detroit Tractor Co. has been organized and incorporated, its capital stock being $100,000. Motor tractors will be made on a large scale at a selling price under $700. The officers of the concern are mostly officials of the Federal Motor Truck Co. They are, M. L. Pulcher, president, who is vice-president and general manager of the Federal company; Chas. F. Mellish, vice-president, who is secretary of the Federal company; L. W. Goodenough, an attorney, treasurer; F. G. Jacobs, secretary.

Thos. E. Reeder, president of the Federal company, and Edward P. Hammond, president of the Gemmer Mfg. Co., are among the stockholders and, with the officers, form the board of directors.

G. S. Jacobs, who is manager, is the designer of the tractor. He was formerly with the Oakland Motor Car Co. and Rapid Motor Vehicle Co., Pontiac, Mich., also with the Rumeley Co., La Porte, Ind. The first experimental models with new improvements have been tested in different parts of the country.

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Pierce-Arrow armored car, before and after bombardment by German artillery. At left, its crew at dinner; right, the wreck. Note brick wall effect painted on side for purposes of concealment. Below, the forward portion of the truck, showing protection for driver

# Forty U. S. Trucks Bag German Fliers

## Pierce-Arrow 5-Tonners in London-model Steel Overcoats Targets for Teuton Shells

By W. F. Bradley

FORTY Pierce-Arrow 5-ton trucks are chasing German aeroplanes in France and Belgium. It is not a vain chase, either, for during the 6 months they have been in active service the trucks have winged at least a dozen German planes and scared away many more. It would be difficult for even an expert to recognize the trucks under the clothing given them by the British Admiralty.

### Artist Disguises Trucks

Before coming to France they received a special nickel steel body capable of deflecting rifle bullets at short range, and had mounted within this body a special quick-fire gun for anti-aircraft work.

Before they go out the trucks are disguised by the scenic artist, the sides being painted to represent a brick or stone wall, a hedge, hayrick, gate, or clump of trees. This is more effective than a dull uniform color, for the vehicle becomes submerged in the general landscape. The duty of the car crews is to remain in places likely to prove attractive to enemy aeroplanes, and either bring them down or drive them away.

As the cars have been very successful in their work, invariably causing the pilots to make for home, they have drawn upon themselves the animosity of the German artillery. When the enemy aeroplanes are fired at, the German artillery will invariably come into action and consume a considerable amount of ammunition in an endeavor to discover the car. They have not been very successful in this, for the mobility of the cars and the skill with which they are disguised makes the German task a difficult one.

Only one of the cars has fallen to the German guns, and this loss did not entail any casualties. The car was paying attention to German planes when it was discovered by German artillery. As the first shot was only 100 yards short, the crew dived into a dug-out to await events. The second shell, a 6-inch, was 50 yards over. The third shell hit the car on the left side, tore away all the lower armor supports, entered and exploded inside the body, blowing off the doors and window flaps.

### Shell Damage Temporary

The explosion burst the gasoline tank, and almost instantly the car was a mass of flames. From the security of the dug-out, only 20 yards away, the crew enjoyed a magnificent firework display for about half an hour. There were 300 rounds of ammunition for the gun, and about 1,000 rounds for the rifles and small arms aboard the car. All these went off at intervals, adding to the liveliness of the scene.

### To the Rescue!

A telephone message sent to the base brought a 5-ton Pierce-Arrow breakdown truck to the rescue as soon as darkness had hidden the scene from the Germans. Although the German gunner had no reason to be ashamed of his shot, he had not succeeded in putting the American truck entirely out of business. The inside of the body was a mass of twisted and charred plates, but an examination showed that the chassis had suffered very little.

Five of the spokes in one of the rear wheels had been burned out; all the rubber with the exception of the strips in contact with the road had been burned away, thus subjecting the entire truck to severe shocks when towed over rough roads in inky darkness. A detailed examination showed that the motor had suffered very little. All the ignition wires were burned out, a few of the lubricating pipes had their joints unsoldered, the springs on the rear pair

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The rear end of the Pierce-Arrow 5-ton anti-aircraft motor truck; note chains and tools and how carried. Right, aeroplane gun cleared for action

of cylinders were useless, but all the essentials were undamaged and the radiator was full of water.

With the spare parts on hand it was possible to have the chassis in running order within a couple of days. The repairs to the armor plating and the changing of the gun entailed more work, but it will not be long before this car will again be on the road with a keen crew aboard her watching and waiting for Germans planes to wing.

### Unscrewing Broken Studs Without Damage to Threads

To unscrew a threaded stud or pin which has no head to afford a purchase for a wrench, pliers are often used. This nearly always results in ruining the threads, and often fails to do the job. A better way is to screw two nuts onto the threads and then fit a wrench to the lower nut. This will turn upon the threads until it strikes the upper nut, when it will jam, and the stud will be turned by the nut.

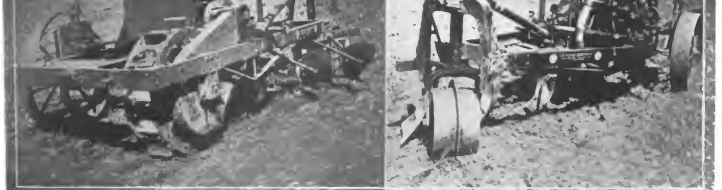
# French Farm Tractor Subsidy

## Government Will Help Farmers to Motorize Agriculture — Alcohol to Be Favored Fuel

A SCHEME has just been instituted in France whereby the Department of Agriculture will grant subsidies for the purchase of gasoline motors and tractors for farm use. The amount of the subsidy will be variable, but will not exceed one-third the total cost of the machine, except where the applicant has suffered by the war; in such cases the amount of the subsidy may be one-half the total cost. The subsidies can be obtained by co-operative farming societies, recognized farmers' clubs having not less than seven members, and professional groups of farmers. For the duration of the war only the subsidies can be obtained by *communes* desiring to purchase motor machinery.

In order to secure the subsidy, application must be made to the Agricultural Department through the local Prefect. This official has to give his opinion on the case and also forward technical reports on the machine intended to purchase, its cost, mode of payment, and the nature of the land on which it will have to work. If the request meets with approval, the subsidy is paid immediately proof has been given that the machine has been ordered and the purchaser's share of the cost turned over.

This scheme, which goes into force immediately, will have far-reaching effects on French agriculture. For the past half dozen years various motor car associations have been educating the farmer to the use of motors on the land, and have so far succeeded that all preju-



The Moto Aratrice in two views, an Italian motor plow driving by a single bull-wheel. It has a twin-cylinder motor and draws its plows into and out of play by elevating the front and outrigger wheels by power

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Lefebvre tractor drawing characteristic French reversible gang-plow. Tractor runs on four wheels and secures additional traction in soft ground by propeller chains at the sides. They may be withdrawn at will for negotiating roads. Insert the Tourand Bergerene machine distinguished by an up-to-date power plant. It is a rotary cultivator wheel-propelled

dice against the new methods have been removed. If more gasoline tractors have not been used, it is entirely due to the inherent conservatism of labor, owing to the war, and the fact that a government subsidy can be obtained for agricultural motors will decide hundreds of farmers into purchasing. The usual government agricultural inspectors are ordered to send in an annual report on the results obtained by the subsidy motors working in their respective districts.

The subsidy scheme is intimately connected with the government proposal to monopolize denaturized alcohol and encourage its use in motors. This bill is now before parliament and provides for denaturized alcohol becoming a government monopoly on January 1, 1917. The government will pass contracts with distillers for the supply of the necessary supply of pure alcohol, and will fix the price at which denaturized alcohol shall be sold retail for periods of 5 years. This price will be determined by the cost of the pure alcohol, expenses in connection with handling and storing and delivery to the wholesale dealers. It is not aimed to make any profit on denaturized alcohol; indeed, provision is made for any deficit to be obtained from the ordinary liquor taxes.

**Farmers to Pioneer Alcohol**

It is evident, therefore, that the first use of alcohol in place of gasoline will be for agricultural motors. The minor advantages which attend the use of alcohol in present motors with the usual carbureter settings will be less serious for agricultural motors than for any other type of internal combustion engine. Starting on alcohol is more difficult than with gasoline, but this is not a matter of any real importance to the farmer.

Certain detail changes ought to be made in carbureter settings and also in motor compressions if best results are to be obtained from alcohol. These changes can be more easily carried out on agricultural machines than on any other class of motors.

As American manufacturers are now delivering a certain quantity of farm tractors in France, and have the prospect of delivering still more, they should pay close attention to the fact that alcohol is likely to be the standard fuel within 2 years. At the present time gasoline is used, and alcohol cannot be obtained if required. But as gasoline costs 52 to 54 cents per gallon, and alcohol may ultimately be obtainable at a third of this price, it is certain that a change will be made at the earliest possible date. The bill now before parliament is meeting with practically no opposition.

The announcement of the alcohol reforms and of the subsidy purchasing scheme gave additional interest to the agricultural motor demonstrations held in the neighborhood of Paris during the past week. These trials were privately organized, but received the support of the government, the Minister of Agriculture being present and the use of soldiers being granted for work in connection with the machines. American manufacturers were represented by five or six machines, among them being the Aultman-Taylor gasoline tractor, the Bull tractor, and the Bijou. There were three or four French machines, all of which had been seen in previous trials, and one Italian make. The preference in france is for a medium or small tractor, capable of being easily handled and turning in a short radius. Land conditions vary considerably, and in some districts the soil is too heavy for the usually preferred light machines to work successfully, but considerable more business will be done with tractors of less than 20 horsepower than with machines of higher power.

The driver sits astride his engine on the Motorculture rotary cultivator. This is the smallest and cheapest of the French products

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# Start of Truck Tour Opening of Electric Show

## Battery Vehicles Prominent in Gotham Exhibition

ELECTRIC trucks occupy their usual prominent position at the Electrical Exposition and Motor Show being held from October 6 to 16 at the Grand Central Palace, New York City, although but two makes are on exhibition. The model electric garage and demonstration track previously included in the exhibition is missing.

Besides Ward and G. V. exhibits of complete vehicles, three makes of batteries are shown, the Edison, Exide and Philadelphia. The Baker, R. & L. Co., manufacturer of Baker electric trucks, is an exhibitor, but is not showing any commercial models.

### New Ward Trailer

The new thing at the exhibit of the Ward Motor Vehicle Co., Mount Vernon, N. Y., is the Ward 500-pound trailer of the two-wheeled type. Only one Ward model is shown this season as against a number of different capacities formerly, the Ward company having determined to specialize on the 750-pound Ward Special. One stripped chassis and two with panel bodies are shown, one trailer with an open body, one electric coupe and two Westinghouse mercury-arc rectifiers, one of 15 amperes capacity and the other of 30, at 220 volts.

The General Vehicle Co., Long Island City, N. Y., exhibits 1,000-pound models in two types, one, a chain-driven panel type which has been in the service of Arnold, Constable & Co. for several years, and the other the worm-driven French hood type, a new vehicle, belonging to Thurn & Co.

The Edison Storage Battery Co. exhibits its full line of nickel-alkaline batteries, a Fairbanks-Morse one-cylinder gasoline engine directly-connected to a generator and an Edison direct-current charging panel, several models of Edison vibrating rectifiers for charging small batteries from alternating-current circuits and the official award ribbon of the Panama-Pacific International Exposition for Edison storage batteries and mine lamps.

The Electric Storage Battery Co., Philadelphia, Pa., exhibits several models of Exide, Hyeap-Exide and Ironclad-Exide batteries and a belt-driven charging outfit.

### Storage Battery History

The Philadelphia Storage Battery Co., Philadelphia, Pa., exhibits, in addition to a full range of Philadelphia thin-plate cells, an interesting historical group of sectional cells. These are five in number, the first, the product of 1906, weighing 35 pounds and having a capacity of 300 watt-hours; the second, 1907, 34 pounds, 340 watt-hours; the third, 1909, 33 pounds, 375 watt-hours; the fourth, 1913, 34 pounds, 405 watt-hours; and the fifth, the latest model, produced in 1915, 33 pounds, producing 405 watt-hours.

President Arthur Williams of the Electrical Exposition and Motor Show handing observer Delahant a message to the Mayor of Cleveland to be delivered via electric truck

In addition to these the Pittsburgh Electric Specialties Co. has four styles of Pittsburgh searchlights on view, one of which is especially designed for motor trucks, consuming but 1 ampere at 6 volts.

### Association Has Booth

The New York Electric Vehicle Assn. has a booth also, used as a rest room and information bureau on electric vehicle subjects.

The opening event of the show was the start of a tour of a Ward Special 750-pound truck from the show to Cleveland, to carry a letter from Arthur Williams, president of the show, to the mayor of Cleveland. The truck was accompanied by John Delahant, the expert of the New York Electric Vehicle Dealers' Assn., to observe its performance, its consumption of current and cost. The truck left Grand Central Palace at 2:30 p. m. on Wednesday, October 6, reaching Peekskill that night and Albany the next day. At Ossining a boost was given the Edison battery because of a detour that was necessary in order to reach Peekskill. On the 45-mile run to that city 111 ampere-hours of current were reeled off, according to the observer. Another boost was taken at Poughkeepsie on Thursday's run. From Albany the truck is proceeding through Utica, Buffalo, Erie and Ashtabula.

The new Ward trailer is a two-wheeled affair, the feature of which is a spring draw-bar connection instead of the usual joint or pivot. Not only does the spring prevent any rattle, but it cushions starting and stopping shocks, it permits the draw-bar to turn in making corners, and

(Continued on page 26)

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The Whitaker Paper Co.'s 2- and 3-ton Packards in Cincinnati

# Trucking Paper Pays

By Kenneth C. Cardwell

**SERVICE TO CUSTOMERS, THE SECRET—MOST ORDERS ARE RUSH ORDERS—FASTER HAULAGE MEANS MORE BUSINESS AT LESS COST**

"WE don't care particularly whether we save anything or not by the use of motor trucks instead of horse-drawn vehicles. We have proved to our own satisfaction, and that of our customers, the rather elementary proposition that they are a good deal more satisfactory in every possible way than horses, and that is why we use them. They enable us to give service which would otherwise be absolutely impossible. Therefore, in order to do this, we use trucks. As a matter of fact, competitive conditions, the necessity of giving the best possible service, have forced virtually every paper house in this city, as well as others, to do the same thing."

### The Logic of Motorization

This view, expressed by one of the principal officers of a leading paper jobbing house in Cincinnati, O., not long ago, explains in a nutshell why it is that all of the leading jobbers in that line in the Queen City use motor trucks for their principal hauling. The fact exists; and its explanation, while based to some extent upon conditions characteristic of the paper trade, also applies with much force to a good many other lines of business. That is, it furnishes the best of all possible reasons why a good many other lines should employ trucks more extensively than they do.

The paper jobber furnishes goods to a great many different lines of business, even when he does not handle novelties of various sorts made from paper, as some of them do. When he sells such goods as this, his activities, of course, are even more widely scattered than is the case with the jobber who sticks strictly to what might be called the straight paper lines. Such a jobber, however, has plenty to do; he sells paper, first and principally, to the printers, whose name is legion, and who are widely scattered. And he sells also to the merchants in every possible line—butcher and baker and department store.

Deim & Wing's 5-ton Rowe hauling paper in the Queen City

### Procrastination and Paper

The mercantile demand alone would mean, in the case of the local business of the average jobber, that deliveries necessarily cover a considerable territory, inasmuch as in most cities there are merchants in various lines in distant suburbs as well as all over the city proper; but there is an element in the demand from the printers which, as suggested above, renders the business somewhat different from most. This is the fact that the average printer, especially of the smaller sort, carries virtually no stock, depending upon the prompt filling of telephone orders by the jobber for his supplies.

"The average printer doesn't order his paper until he has his forms made up and on the press," declared one paper man. "And when that order comes in we've got to fill it at once, because the printer wants his paper without any delay. That means the quickest possible delivery—and that, in turn, means motor trucks."

The Whitaker Paper Co., one of the larger paper jobbers in Cincinnati, with branches also in Baltimore, Boston and elsewhere, may be taken as representative in this respect, and it also has a line of business which renders its case even more interesting than the ordinary jobber's. It is one of the largest handlers of news-print, the paper used by newspapers, in the country; and this line of goods not only comes in large quantities—carloads—but is also delivered in

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quantities. The unit is a large roll, weighing several hundred pounds, and a few of these are all that an ordinary two-horse wagon can handle, whereas a 5-ton truck can move off easily with several times a wagon-load.

This, with the requirements of speed and promptness which are present in the case of every paper-jobbing house, is the reason why the Whitaker company recently placed an order for its third Pierce-Arrow truck, a 2-ton machine, making its fifth truck, as it also operates two Packards. One of the Packards is a 3- and the other a 2-ton machine, while one of the older Pierce-Arrows is a 5-tonner, the other a 2-. The company also uses a Ford, equipped with a light delivery body, for various utility purposes, such as the delivery of small rush orders and samples, and still employs several wagons for work not requiring speed. These, however, will ultimately be displaced by trucks, as this is the company's decided policy.

The two Packards, which have been in service for 4 and 5 years, respectively, are in perfect shape, having been rebuilt, the Pierce-Arrows being newer. All have given good service continuously, however, under the supervision of the local service stations, under the extremely difficult conditions which are present in Cincinnati, including rough paving in the downtown section, and the numerous hills encountered, especially in moving from the business section proper to the suburban districts.

### Horse Sentence Passed

"Besides greatly extending our radius of service, and permitting us to reach outlying customers much more rapidly than before," said President A. L. Whitaker, "the machines enable us to handle both incoming and outgoing shipments, in the large quantities which we frequently handle, more quickly and conveniently than was ever the case with wagons. We use trucks, in fact, at all of our branches, and ultimately will employ no horses at all."

The Diem & Wing Paper Co., another large Cincinnati jobber, follows a policy which differs from that of the Whitaker company only in the make of trucks used, which, after all, is not a difference in principle by any means. This company has for some time owned a 3-ton Vulcan, with a body made by Donahan, of Cincinnati, and a 2½-ton Decatur, and recently acquired a 5-ton worm-driven Rowe, with a body specially constructed by Kelly & Roth, of Cincinnati, including a cab which can be completely closed in bad weather, by virtue of a solid-frame front. A Ford for light deliveries and three wagons complete the local delivery force of the company.

"Service is the whole answer," said an officer of the company. "Here is the idea: Paper is a heavy commodity—about the heaviest, I suppose, outside of the metal field; and, on the other hand, it is nearly always needed in a hurry. When a customer wants it he wants it badly, and will brook no delay. The quickest way you can get it to him is none too quick. We adopted trucks because they are obviously faster than wagons, besides being able to carry a good deal more; and with these two points of superiority it became immaterial whether they also possessed the third advantage of actual cash saving as well.

### Trucks Are Cheaper

"As a matter of fact, it is certain that they do possess this advantage. For one thing, hay used to sell for $18 a ton, and is now $23; oats used to sell at 44 cents, and is now selling at 62; while gasoline has been around 20 cents, and can now be had in quantities at about 11 cents. A wagon can handle about 1,500 pounds, while one of our trucks can empty a car in three loads. The trucks can go faster and farther, with bigger loads. What more could be asked?"

The wagons at present are used by the company for the less urgent deliveries, especially those in the down-town district—for the short hauls. Of course it is on the long hauls that the advantage of the machines becomes most clearly apparent, as they have a range of 15 to 20 miles, covering the company's deliveries to printers and merchants in the numerous towns around Cincinnati, to many of which it was necessary either to resort to the slow and expensive method of freighting or to haul by wagon.

### The Early Bird Wins

In all of these particulars the paramount consideration of service to the customer is plain. In view of the fact that the printer nowadays demands paper for various purposes to be delivered at once, for the job in hand, it is obvious that the jobber who can make the quickest delivery regularly is going to get the printer's business. This actuated the first jobber who installed a motor truck, whoever he was; and, in turn, the distinct advantage which this gave him resulted in other jobbers following suit, until at present every paper jobber of any importance in Cincinnati uses motors. Competition has made is essential.

The Diem & Wing trucks are inspected daily by the plant engineer, an expert mechanic, who sees to it that they start out in good shape. Records are kept, following the Goodrich system, covering all phases of operation and maintenance, and the company is planning to use the Service Recorder Co.'s device for the purpose of having a record of the stops made, in order to keep an absolute check upon the operation of the machines. These precautions naturally work for economy; but the company's position is not that the trucks are on trial, under the necessity of proving that they save money directly. They have made good from the service standpoint, and, having done that, they have justified their use.

A 2-ton Pierce-Arrow used by the Whitaker company

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**Master Carbureter Catalog,** recently brought out by the Master Carbureter Corp., Detroit, is a 5½- by 10½-inch, twelve-page booklet, giving the sizes of Master carbureters which may be used on various models of fifty-two makers of motor trucks. These sizes are tabulated in a table alphabetically according to the make of the truck. Besides the carbureter size in each case, the tabulation also contains the year model of the truck; the capacity in tons; the number of cylinders; the bore and stroke; the type of distributer to be used in the Master unit, and the kind of flange or fitting required. A table of similar nature is compiled for passenger vehicles. A third table gives the proper sizes of Master carbureters to be used on the various makes of motors. This tabulation is also arranged alphabetically and gives after the name of the motor, its model number, horsepower, etc.

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# Local Geography, Traffic, Trade and Paving Conditions Affect Delivery

## Circumstances Cause Differences in Shipping Room and Vehicle Operating Methods in Use

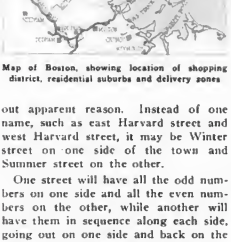
LOCAL conditions have an influence over department store delivery methods and requirements that should not be overlooked. In the last issue of THE COMMERCIAL VEHICLE an analysis of conditions all over the country showed the general trend of development in the stores of the smaller centers. A further analysis on a more intimate basis made by editorial representatives in six representative cities in the eastern, central, western and Pacific sections of the country shows that much of the variance between delivery methods in different localities is due to differences in the geographical features of the cities, the manner in which the buying public lives, the traffic conditions, the density of population, and the nature of pavements in streets and alleys.

The cities investigated are: Boston, Mass., Hartford, Conn., Cincinnati, O., Louisville, Ky., Kansas City, Mo., and Los Angeles, Cal. The maps on this and the following page show the boundaries of the cities and their situation with respect to bodies of water, rivers and heights, all of which have an intimate relation with delivery conditions. The maps also indicate the delivery radii and the contributary suburbs and dependencies.

### Boston Contends With Bad Streets and Traffic

Boston's business section covers a very small area, practically all of it, with the exception of the Back Bay section, being within 1 mile of the state house on Boston Common. In this territory the streets are very narrow and crooked and are badly paved. In the residence section, included in a radius of from 2 to 5 miles, the condition of traffic and pavements is only slightly better. The residence section of Boston is not included in the city proper to any great extent, but consists of an aggregation of small suburbs, each practically a municipality in itself.

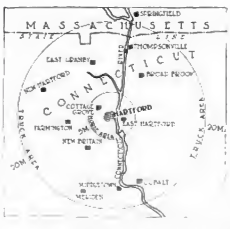
No attempt is made at uniformity in street names of numbers. Streets, bearing the same names will run in all directions and streets running in a continuous direction will change names and numbering systems frequently and without apparent reason. Instead of one name, such as east Harvard street and west Harvard street, it may be Winter street on one side of the town and Summer street on the other.



Map of Boston, showing location of shopping district, residential suburbs and delivery zones

One street will have all the odd numbers on one side and all the even numbers on the other, while another will have them in sequence along each side, going out on one side and back on the other. South Boston is the only exception to this muddled state of things. In that suburb the streets are numbered in one direction and the intersecting streets lettered.

Much trouble is caused by duplicating names of streets, such as Harvard street, Harvard avenue, and Harvard square, all close to one another, yet having no logical relation. A sales clerk writing street instead of avenue, for example, will cause endless trouble for the delivery department.




Hartford, Conn., its dependent territory, business section and zones of delivery

Duplication of streets is also indulged in by different suburbs. Every suburb seems to insist on having at least one street named after the university in Cambridge. There is a Harvard street in Boston proper, another in the Bunker Hill district, a third in Dorchester, two in Allston, all of which are parts of Boston, and also one in Cambridge. There may be others.

Summer street, Winter street, Oak, Myrtle and other like names are to be found everywhere. Commonwealth avenue is the dividing line between Boston and Brookline. Each municipality has its own exclusive system, or lack of system, for numbering. Number 1,200 on one side may be ½ mile from 1,225 on the other.

Nowhere within a 5-mile area, centering about the State House, are street conditions good, the streets in some portions are slightly wider, but they would all be classed as narrow in Chicago, Milwaukee or any of the western cities. Blind ends are innumerable and practically the only continuous thoroughfares leading from one important section to another are boulevards, from which delivery vehicles are excluded.

#### Paving Not All Good

Brick and dirt pavements prevail, and these are not all in good repair by any means.

Between a 5- and a 10-mile radius, conditions improve, for this is the newer zone of development. These sections, however, are not built up uniformly, and this entails many long jumps for drivers. Communication, other than by boulevard, is not always good, and senseless detours are often necessary.

In Boston the large delivery area due to the great percentage of suburban population and the perplexing localisms of street names, house numbers and routes have caused department stores to intrust a greater proportion of their deliveries to local deliverymen than in any other city of consequence in the country.

Suburban expressmen who make daily or semi-daily trips between Boston and their home suburbs contract to deliver the packages of a number of stores for a flat rate per package, with higher rates for large articles, and the stores content

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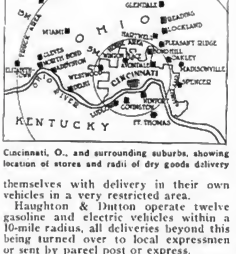



Cincinnati, O., and surrounding suburbs, showing location of stores and radii of dry goods delivery

themselves with delivery in their own vehicles in a very restricted area.

Haughton & Dutton operate twelve gasoline and electric vehicles within a 10-mile radius, all deliveries beyond this being turned over to local expressmen or sent by parcel post or express.

The territory is so extensive and the small centers so scattered that the substation system as used in Chicago, New York and Philadelphia is impracticable owing to the impossibility of assembling a sufficient number of routes to warrant the establishment of a sub-station in any territory of sufficiently restricted area or with sufficiently accessible means of intercommunication.

Filene's uses eighteen Fords, thirteen of which are constantly on the active list and five in reserve. This fleet serves a radius of 12 miles, two trips per day, averaging 60 miles per day. This territory is mapped out into fourteen routes, and these include 90 per cent of the Filene customers, much unlike any of the other Boston stores.

In the city proper, however, it does not attempt to deliver its own parcels, but turns them over to the Clearing House Parcel Delivery Co., a concern which delivers more than any two Boston stores combined and which does nothing else but deliver for Boston stores.

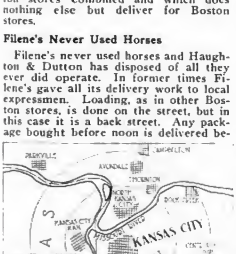
### Filene's Never Used Horses

Filene's never used horses and Haughton & Dutton has disposed of all they ever did operate. In former times Filene's gave all its delivery work to local expressmen. Loading, as in other Boston stores, is done on the street, but in this case it is a back street. Any package bought before noon is delivered before 3:15 that afternoon. Most of the Boston stores have well-planned and efficient shipping room schemes.

Filene's has had 3½ years of truck experience and uses nothing but pneumatic tires. Haughton & Dutton began using motor equipment 6 years ago. They have 100 horses which cover all of the shorter hauls. Five of their twelve trucks are used for furniture and heavy deliveries, in which work they cover a greater territory than the seven parcel delivery vehicles. The furniture trucks are two 2-ton Packards, two 1½-ton Autocars and one 1-ton G. V. electric. The parcel trucks are three 1-ton G. V. electrics, one G. V. ½-tonner, one Lansden ½-tonner and two ¾-ton Stewarts.

Mileages for two trips average from 50 to 60, on different routes.

Haughton & Dutton operate the only interior loading system in Boston. The store is located on one of Boston's steep hills, the third floor being on a level with the back street while the main entrance on the main floor is on Tremont street. The third floor delivery room is steel-lined and all trucks are loaded there, the electrics using it as a garage.




Kansas City and its dependencies in two states, business section, residence portions and delivery zones

## Hartford Merchants Strive for More Territory

Hartford is a city of 125,000 people and is the natural trading center for towns in all directions for a distance of from 15 to 25 miles in different directions, respectively.

Hartford streets are good. The main arteries are covered with asphalt to the city limits and beyond are covered with oiled macadam and concrete. There are few bad hills. Streets off the main routes are good. The immediate business center of the town is about 1 mile in diameter. In a 3-mile radius are included the towns of West Hartford, East Hartford, Hockanum, Wethersfield, Wilson Station. Add another mile and there is South Wethersfield, Glastonbury, South Windsor, Burnside and Windsor. Ten miles from Hartford are the Manchesters, north and south, New Britain, Newington, Farmington, Windsor Center and Rocky Hill.

Fourteen miles out is Rockville, a good patron of the Hartford establishments. Equidistant to the southwest is Bristol, another good customer. Eighteen miles south is Middletown, rapidly developing into Hartford territory despite the fact the town has stores of its own. Sixteen miles south of Hartford is Meriden, which is also coming Hartford's way in the matter of trade.

In Hartford, purchased service is the principal peculiarity. These stores instead of owing their own trucks, or going to the other extreme and hiring the delivery work done by outsiders, hire the vehicles and then do the work in their own way.

Whereas in Boston the stores have not been compelled to extend their delivery radii because of competition as they have everywhere else, those in Hartford find that the service of the greatest possible delivery area is a vital point in the struggle for trade.

Last summer G. Fox & Co. tried a new and bold experiment, delivering packages direct from the Hartford store to Noank, Conn., a distance of 175 miles round trip all in 1 day. On this trip deliveries to various beach resorts were also made. Delivery in New London, 50 miles away, is not infrequent during the summer season.

Louisville, Ky., and nearby residence centers with shopping district and areas served by delivery

All of the Hartford stores deliver direct from the stores, except furniture deliveries, which are usually made from warehouses, as is the usual custom everywhere.

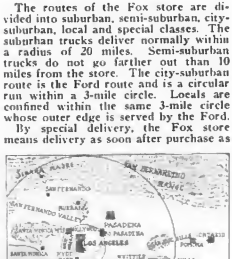
The Fox store secures its delivery vehicles at so much per week, its fleet consisting of eleven vehicles, two of which are ¾-ton Whites; three, rebuilt Cadillacs; one, a ¾-ton Atterbury; a ½-ton Modern; a ¾-ton Modern; a 1-ton Gramm; a ¾-ton Macon and a Ford. All of these with the exception of the ¾-ton Atterbury and the 1-ton Gramm have pneumatic tires, although originally solids were used to a greater extent.

Speed is the principal reason for the adoption of motor vehicles, and pneumatics are used because of their superior speed capabilities.

### Four Delivery Zones

The routes of the Fox store are divided into suburban, semi-suburban, city-suburban, local and special classes. The suburban trucks deliver normally within a radius of 20 miles. Semi-suburban trucks do not go farther out than 10 miles from the store. The city-suburban route is the Ford route and is a circular run within a 3-mile circle. Locals are confined within the same 3-mile circle whose outer edge is served by the Ford.

By special delivery, the Fox store means delivery as soon after purchase as




Los Angeles, city and county, its trading territory, locus of stores and radius of dry goods suburban delivery

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possible, but not by means of a special messenger. Instead, two trucks are used for this work, making trips to all sections of the territory between the times of the regular delivery trips.* The necessity for this mainly arises in the early morning, when deliveries are usually effected within 1 hour of purchase.

On the suburban runs one trip a day is usually made. The Ford makes two regular trips besides doing special work. The demand for quick delivery, that is, shorter time than required by the regular system is growing. Those special trucks which also handle furniture make five trips a day.

At the Fox establishment the quarters are not large enough. Each driver goes in and selects his deliveries under the supervision of the delivery manager.

Ten horse-drawn wagons are used in the Fox delivery. This service is also purchased. Two of the teams are used in suburban work, the others are local. One team is used about the storehouse, which is on the opposite side of the street. Some of the horse vehicles cover 20 to 25 miles in a day.

The service of Wise, Smith & Co., which is for the most part of the hired variety, illustrates how Hartford stores are gradually extending their delivery sphere. This firm now delivers in Thompsonville, near the Massachusetts border, in the face of the fact that the natural trading center is Springfield. And the trade is increasing.

### All Deliveries Direct

Aside from furniture, which is taken from the storehouse nearly ½ mile from the main store, all deliveries are direct from the store. The approach to the delivery department is down a steep incline paved in cement and turns are of necessity short and abrupt. The shipping room is in the basement of the big building. There are thirteen bins about 1½ yard square which are formed with wide mesh wire. The bundles come down to the shipping room plainly marked with the purchasers' names. Then they are sorted. The bins, one of each of which is assigned to a driver and route of a truck or horse team, are arranged in two rows. The bundles are placed in these bins for the drivers.

In the Wise, Smith service there are four G. V. electrics, one a 1-tonner, used for furniture delivery. These are owned by the company and operated under the battery system of the Hartford Electric Light Co., which was recently described in THE COMMERCIAL VEHICLE.

Of the gasoline vehicles three are on Pope-Hartford passenger chassis with delivery bodies and are fitted with pneumatic tires. One Cadillac is used, one White and one Willys Utility. Seven horses are employed. Two of the teams are double, the rest single.

The gasoline trucks handle the outside business and the horses also come in for this. The electrics are confined to the city and are fitted with solid tires. The front set on the Willys is of the cushion type.

Besides special deliveries the electrics make two regular trips per day. Some of the gasoline trucks average 70 to 100 miles a day. These vehicles have greatly increased the delivery zone, going north as far as Thompsonville, to the west as far as East Granby, to the east as far as Broad Brook, south as far as Middletown. All these towns are included within a 20-mile circle. New territory is being constantly opened up

Type of delivery body used by The Crescent, a Spokane, Wash., store, mounted on a White 1,500-pound chassis

## Louisville a Compact City Bad Suburban Roads

Louisville is compact, the boundary being circumscribed by a 4-mile radius about the retail district, which lies in the north-central portion.

Unlike Boston, Louisville's bad streets are on the inside rather than the outside of the business district. The residence section is closely built, and the stops of dry goods truck are close together.

The residential sections are divided distinctly. Here will be a workingman's neighborhood; here a prosperous nonfashionable neighborhood; here a fashionable neighborhood, occupied by the well-to-do. Patronage is similarly divided in the major part, one store, for instance, which caters to the highest class of trade does the bulk of its business in three well-to-do and fashionable districts in the city and a series of fashionable suburbs east of the city. Only infrequently are deliveries necessary to other parts of the city and county.

In Louisville there is but one exclusively-motored department store, but all of the big stores use motor trucks for medium to long-haul work.

The largest of the Louisville stores is the Stewart Dry Goods Co., whose delivery fleet does the work of J. Bacon & Sons. Both of these stores are associated with the Claflin organization, the former being connected with the McCreery stores in New York and Pittsburgh and the Higbee store in Cleveland.

The delivery department of the two stores is located in separate quarters, midway between the two stores. This location is temporary, the delivery department having formerly occupied part of the Stewart warehouse, now razed to make room for a newer and larger one.

The trucks number eight, four Fords, one ¾-ton White, one ¾-ton G. M. C., one 1-ton Selden piano truck and one converted Cadillac passenger chassis. In 1910 the Stewart company purchased four Rapid trucks, but there were later replaced by the other trucks.

The four Fords serve the four corner residence sections of the city, Crescent Hill, the Highlands, Parkland and Portland, making three trips and averaging 60 miles per day. The Cadillac covers the Indiana towns of New Albany and Jeffersonville, making one trip of 55 miles length daily. The White handles general suburban deliveries, making three trips a week to each suburb as far east as Crestwood, 20 miles, averaging about 80 miles daily.

The G. M. C. is a freight truck and helps some in deliveries of heavier goods and on long hauls, as needed.

The Kaufman-Straus Co. operates one Overland 800-pound vehicle and two Fords in addition to three horse wagons. When heavier buying sets in more trucks are likely to be added, rather than securing the services of additional horses, as is the method of expansion and contraction in use by the Stewart company. The Overland serves a radius of 20 miles on both sides of the river, the Fords, the four corner residence districts, and the horses the central portions of the city. The Fords average 55 miles per day and

A pneumatic-tired Autocar used in Philadelphia by J. B. Sheppard & Sons

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One of the Crescent's city delivery vehicles with a panel body mounted on a Baker electric chassis of ½-ton size

the Overland 100. The Fords deliver 200 packages per day as against 175 for the horse wagons. The Overland delivers from 50 to 100 packages on its different routes, covering each point three times weekly.

Herman Straus & Sons Co. formerly used three ¾-ton Jeffery trucks, which gave good service, but proved too heavy for the needs of the territory and so were replaced by three Vims of 1,000 pounds burden. The lighter trucks deliver the same amount of goods daily and make the same average, 55 miles per day.

H. P. Selman & Co. operate three commercial vehicles and no horse wagons, these being two ¾-ton Jefferys and one Overland of 800 pounds capacity. Previously two Flanders 800-pound vehicles were used, but these proved too light for the work. The present ¾-tonners it finds are too heavy and so a change to cars of medium weight is contemplated.

John C. Lewis & Co. operate the oldest dry goods store in Louisville, and owned some 15 or 16 years ago one of the first six motor trucks in the Kentucky metropolis. The truck was an electric and after serving a checkered career as an experimental and advertising vehicle it was wrecked by a street car. Since then and up until 18 months ago horses have been adhered to. Then a rebuilt Case touring car was put into service, followed shortly by another of the same make.

Their loads, even when delivering confectionary and ice cream—specialties of this store—do not exceed 500 pounds. Eleven horse-drawn delivery vehicles are used in addition to the motor trucks.

## Cincinnati Homes Perched on Surrounding Hills

While the business section of Cincinnati, in which the larger stores are all located, is entirely level, lying in a narrow valley along the Ohio river, the greater part of the residence districts and suburbs served by the stores are located on the surrounding hills, some at a considerable distance from the business center. The number of customers served in the low-lying part of the city is relatively small. The close-in residence district, even comprising Mt. Auburn, Mt. Adams and West Walnut Hills, is on the hilltops, necessitating long pulls, which are particularly hard on horses. These three suburbs are within a mile.

The longer hauls are to Madisonville and vicinity, about 8 miles; Glendale and territory *en route*, about 15 miles; Pleasant Ridge, about 8 miles; Westwood, about 10 miles; Price Hill, 6 miles. The Kentucky side of the river, comprising the cities and towns of Covington, Newport, Dayton, Bellevue, Ludlow and Ft. Thomas, is served by all of the stores, as the greater part of this district is quite close. As a rule, however, it is all grouped, which brings in the long uphill pull to Ft. Thomas, 3 or 4 miles, all steeply upgrade, and to Rosedale and Latonia, some 4 or 5 miles.

A White ¾-tonner used in Providence and Boston by the Sheppard stores

The streets in Cincinnati and vicinity are generally very good, wood blocks and asphalt predominating, especially in the residence districts, although there is some granite paving on the streets where the hauling is heaviest, such as on Gilbert avenue, which is the main thoroughfare into Walnut Hills and the northern and eastern part of the city generally.

The average haul is probably shorter than in cities where the topography is less uneven, but the necessity of pulling long grades has resulted in quite an extensive use of trucks.

Extension of delivery territory is the trend among Cincinnati department stores. The hilly nature of the city and surrounding country restricts horse delivery considerably and greatly reduces its speed. Deliveries are made to cities as far distant as Aurora, Ind., Hamilton and Middletown, O., distances of 20, 25 and 30 miles from Cincinnati, and to Fort Thomas, Glendale and Price Hill, formerly reached by the package vehicles once a week to every 2 days, but now every day.

The George McAlpin Co. has a White ¾-ton furniture vehicle which makes deliveries to Dayton, O., 52 miles away, covering Hamilton, Lebanon and Middletown on the way. Alms & Doepke, operating the largest store in the city, make deliveries to Rising Sun, Ind., 26 miles, and Fayetteville, Ind., 40 miles.

Shipping room systems are very archaic in Cincinnati, and loading methods poor. Most of the buildings are old and the alleys are mostly too narrow to use. Sidewalk lifts are used by some of the stores while others truck the packages through the store and over the sidewalk.

### Loading Under Difficulties

The Rollman & Sons Co. has a basement shipping room, to which the parcels are taken by a boy with a roller box who goes through the aisles of the store collecting them, takes his roller box down on the elevator and from thence about 50 feet to the shipping room. Wheeled hampers are again used for loading into the trucks, the roller hampers being wheeled 50 feet to the elevator, lifted up to the street level, pushed through the store to the Fifth avenue entrance, and so over the sidewalk to the waiting trucks.

H. & S. Pogue Co. plans, in its new store, to install a modern system of belt conveyors for sorting and a concourse within the building itself for loading, so that only the trucks will cross the sidewalk, and then only when passing in or out. The present loading scheme is by means of sidewalk lifts.

Alms & Doepke have a chute from the third floor of their store, with openings at the second and first floors which collects the parcels for the basement shipping room. There, a long metal chute runs between the bins, from which the packages are sorted and routed directly into the bins by two men. In rush seasons an additional platform for preliminary sorting is used. Loading is accomplished by wheeling hampers 40 feet to sidewalk lifts located on the quietest of the four streets upon which the store fronts.

Only one truck at a time can be loaded by the Mabley & Carew Co., because the alley in which it is done is only 15 feet wide and the trucks have to enter it at one end and emerge at the other, wait-

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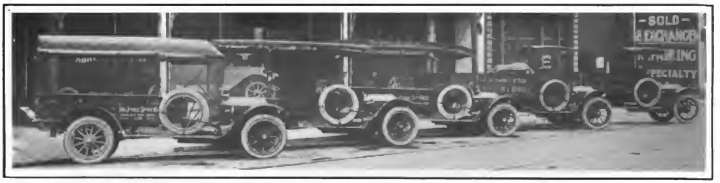



Five of the nine Whites used by the Jones Store in Kansas City. Note that each carried a spare tire inflated on its rim

ing their turn to load from the sidewalk lift, on the alley sidewalk. Within, however, the system is well laid out, spiral gravity conveyors communicating with all floors and terminating in a compact and modern shipping room with forty drivers' bins, each with its own hamper.

The McAlpin store has five trucks, two ¾-ton Whites, two 1-ton Armleders and one Ford. Rollman & Sons have four 1-ton Armleders and one Ford. The H. & S. Pogue Co. has used motors exclusively for the past 2 years, its present fleet of eleven Autocars have replaced thirty horse wagons. In addition to these it operates a 2-ton Packard furniture vehicle and three Fords. Alms & Doepke have the largest department store in Cincinnati, its truck equipment consisting of nine Macks of various capacity, five 1-ton Republics, one 2-ton Packard, one rebuilt Peerless touring chassis and four Fords.

Mabley & Carew have been using nothing but motor delivery for 3 years, the present equipment comprising six 1-ton Armleders, two ¾-ton Schachts and two Fords, these ten trucks having replaced eighteen wagons and serving a wider territory and a greater number of customers.

## Kansas City Hills Bar Heavy Vehicles

Kansas City lies at the forks of two rivers and is divided naturally into three sections, one of which lies entirely in Kansas and is the original Kansas City, a second, partially in Kansas and partially in Missouri, this section being the main portion of the city, and a third, entirely in Missouri, being mostly suburban and residential.

The fact that Kansas City is hilly affects the delivery situation very materially. The central section of the city, most of which is on the Missouri side of the imaginary state line, occupies an area approximately 2 miles long and 1 mile wide. The suburbs, east, west and south, are located within radii of from 5 to 7 miles.

Kansas City with its suburbs comprises an area upwards of 250 miles of hilly country and about 50 miles of water. It has an urban area, including Kansas City, Kan., and Rosedale of 75 square miles, and is sparsely built-up, owing to the uneven nature of its topography. The city proper is 8½ miles long and has over 400 miles of streets, few of which are straight for any great distance and which present all sorts and conditions of pavement.

Grades are omnipresent and some of them are quite stiff.

In Kansas City, a visit to the four leading dry goods houses—the Jones Store Co., the George B. Peck Dry Goods Co., the Emery-Bird-Thayer Co. and the John Taylor Dry Goods Co., shows that the methods of assembling packages in the store is of a mediocre sort, the goods being taken by roller boxes and elevators to upper floors, where they are sorted and routed and then sent down in elevators to basement loading rooms or to sidewalk loading stands.

All of the above stores use mixed fleets, partially horse wagons and partially motor vehicles. Many of the roads in what ought to constitute the motor zone are often in such poor shape that trucks are unable to make any showing on them and horse vehicles are used instead, while horse delivery is exclusively used in the central portion of the city.

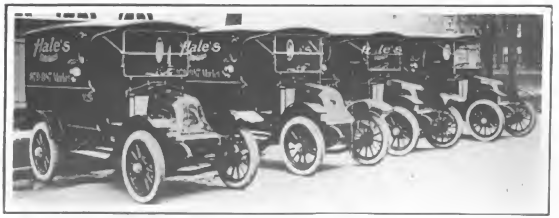
The Jones Store has nine Whites and one Ford. The John Taylor store has six ½-ton Detroit electrics and two ¾-ton Studebakers. The Emery-Bird-Thayer company operates one Pierce-Arrow rebuilt touring car chassis, two ¾-ton Velies and four ¾-ton Whites. The Peck company uses two electrics and one 1,500-pound Buick.

All of these stores agree that heavy vehicles are out of place in Kansas City hills for the delivery of 300- to 500-pound loads of dry goods. Pneumatics are not greatly favored in Kansas City, owing to road conditions, cushion tires being used on the gasoline vehicles and solids on the electrics.

Loading in Kansas City is done principally from open areas adjacent to the stores or in alleys back of them, the goods being taken from the basement bins to the ground level by elevators.

## Los Angeles Reaches Far for Dry Goods Trade

Los Angeles lies among the foothills of the Sierra Madre and embraces a considerable suburban territory. An arm of the city only recently annexed reaches to the sea and includes San Pedro, the port, and incidental points along the way. Besides the populous beach cities of Long Beach, Huntington Beach, Redondo and Ocean City, not to name a number of lesser resorts, Los Angeles reaches back into the hills and claims the trade of Pasadena, South Pasadena, San Gabriel and Alhambra, Pomona, Ontario and Whittier. Up the valley to the north, which is the gateway to San Francisco and the interior valleys, Glendora,




Four of the Lippard-Stewarts used by Hale's store in San Francisco and Sacramento, all on pneumatic tires

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Two of the Culbertson - Grote - Rankin Co.'s Commerce 1,500-pound delivery trucks in Spokane, Wash.

Hollywood and Universal City, the motion picture metropolis, Burbank and San Fernando yield their tribute, and to the south, Whittier, Fullerton, Anaheim, Orange and even Santa Ana contribute their share to the Los Angeles trade.

The downtown delivery section extends about 6 miles north, south, east and west from the business center. Hills to the north and northwest and heights to the southeast break up the district, so that detours are often necessary to reach nearby points, which greatly add to the required amount of travel to reach them. Industrial districts to the northeast and at the southern end of the central section also complicate matters so that the density of deliveries varies greatly throughout this area.

### Detours Often Necessary

Suburban deliveries are made within a radius of from 20 to 25 miles, some of the beach cities being closer than this. Arroyos, those deep, wide, dry river beds of the Pacific country, prove effective barriers to direct routes to almost anywhere, some bridges over the Arroyo Seco having recently brought the Pasadenas considerably closer than before. In the main, however, circuitous hauls around the rim of this district, zig-zagging between inner and outer towns to some extent and considerable retracing of routes is necessary to reach all suburban purchasers.

Roads, as a rule, are excellent. Splendid boulevards lead to all sections except the southeast, and trade vehicles are not excluded. In the rainy season, however, which, by the way, is the height of the tourist season, when the trade is great, some of the roads become very troublesome for 2 or 3 days at a time, but during the long dry spells during the rest of the year, road conditions are all at least fair and average better than prevail in the eastern cities.

Adobe mud, like the gumbo of the south, is a sticky clay which rolls up on the wheels and sticks when the weather is wet. Water stands high on some of the roads when a spell of rain is encountered, but drainage is being provided in spite of the fact that such periods only occur three to five times in a winter and seldom last more than 3 days.

Both the city and county of Los Angeles have practically all main roads splendidly paved with asphalt-topped concrete. The low cost of asphalt, produced from native oils and the possibility of using a thin slab concrete base makes these roads cheap to build, while the absence of extremes of temperature renders them durable.

Private passenger cars are owned by one out of every five families in Los Angeles county and so the interest and support of good roads is very effective.

Alleys, paved, or made on gravel soil traverse most of Los Angeles and are a convenience in loading and getting through traffic in the business center.

### Native Sons Are Progressive

Los Angeles stores are conducted on an up-to-date and efficient plan, almost without exception, horses being almost unknown as delivery means and sorting arrangements being comparable favorably with the best installations in the large eastern stores.

The Broadway Department Store has the most fully-equipped delivery department, and it was carefully planned as a unit in connection with a building addition doubling the size of the store. The delivery department is in the sub-basement, trucks ascending and descending on a large elevator, with a twin elevator held as an emergency reserve. Packages are delivered to the basement by a spiral chute terminating over a belt conveyor from all floors above the first. From the first floor and basement they are dropped directly on the belt.

Assembly of packages on the upper floors is made in rubber-tired roller-boxes continually making rounds and responding to calls, carrying the goods from the wrapping desks to the chutes. Sorting of packages is done in the basement by the familiar system of a dumping table at the end of the chute, along which packages are transferred by hand to sorters, who toss them into sorting bins corresponding to routes, where they are written up and tossed across another gap into the drivers' bins.

### How They Load Out West

The trucks line up against the wall, the driver and helper, after having the wagon bin opened from the inside, sorting the packages on the floor in front of the bin, then back the truck up close and load in the reverse order of delivery. When loaded the truck moves out between the other trucks and the bins.

The wide space between the wall and the bins is an important feature, enabling sorting, loading, and in and out movement to progress without interference between crews. Dimensions, detail arrangement of bins, location of offices, etc., have all been planned on definite data, and it is impossible for a blockade to occur at any point, as there is an emergency route for each operation.

(Continued on page 26)

A few of the ten 1,500-pound Whites used in Cleveland by the Higbee Co.—showing body types for city and country

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# Route Modification Equalizes Truck Work

## Two Helpers per Truck Often Enable Same Dry Goods Vehicles to Handle Greater Volume of Business During Rush Periods in Usual Time

CONTRACTION and expansion of department store delivery routes are necessary when changing from horse to motor equipment; also during the peak-load seasons of the year, as well as during special sale weeks and during the summer to accommodate the large increase in the suburban and resort deliveries.

In changing from horse to motor equipment, the routes are naturally made much longer, go farther out into the country and cover a bigger territory in square miles. More trips can be made per day, especially when one or more helpers are supplied on each truck, these cutting across lots after making deliveries to meet the vehicle at some predetermined point.

During the peak-load periods of the year, practically all of the routes must be somewhat modified in order to meet the varying volume of packages to be delivered in any one given area. The aim of this modification is to equalize the work of each vehicle as much as possible and to deliver the greater number of packages in the same time as under normal conditions.

One of the Urban electrics used by Mandel Bros. in Chicago. A special feature of this vehicle is that a portion of the battery is carried under a conventional hood forward of the dash, thus improving the appearance of the conveyance and permitting the use of an especially large cab with free access to the driver's seat on either side

The question as to whether it is better to split the routes or to take portions of several routes and combine them into an entirely new route depends upon the conditions under which the vehicles have to work in each case. The John Wanamaker company in Philadelphia is continually changing its delivery routes to suit the delivery conditions in the off-peak periods as well as in the rush seasons.

The type of vehicle, whether gasoline or electric, also plays an important part in the rearrangement of routes, especially in the middle area where the electric delivery ends and the gasoline delivery begins. Gimbel Bros. in New York, who use all electrics for city delivery, find it more economical to add a small portion to several of the electric routes than to make a new route for a gasoline vehicle because of the long run through the electric area before the first delivery is made.

One of the fleet of nine 1,000-pound Baker electrics used by Halle Bros., Cleveland, and equipped with a highly-polished and distinctive-looking panel body

Halle Bros. and the May company in Cleveland; the Rosenbaum company and Kaufmann & Baer in Pittsburgh; Lit Bros. in Philadelphia, and the Jordan-Marsh company in Boston, run either split or combination routes, according to the conditions in each particular case.

Where gasoline vehicles are used to make both local and suburban deliveries, some of the vehicles are taken off the city routes during the summer months when the city deliveries are below the average and put on the suburban routes, or else overhauled, if the increase in the suburban trade is not sufficient to warrant the addition of more vehicles.

Lord & Taylor and Gimbel Bros. in New York, both of which concerns use electrics exclusively for the city deliveries, of course cannot use the electrics for this long-route work and the burden of the greater deliveries falls on the gasoline vehicles, which run longer hours and sometimes have two helpers.

A 3½-ton G. M. C. truck used by the Bon Marche department store in Seattle, Wash., for the delivery of all heavy and bulky articles sold from the food stuffs department of the store. Barrels of sugar are shown being loaded in the view above

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Both of these concerns maintain sub-stations in the suburban territory which their vehicles serve. Packages are transferred from the main store to the sub-stations in each case in large-bodied trucks and the final delivery to the customer is made in lighter and speedier vehicles operating out of the sub-stations, which also serve as garages.

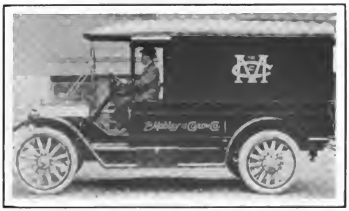
The question whether it is more economical to deliver direct from the store or to maintain sub-stations depends upon the volume of business done in the suburban territory, the delivery radius served and the quickness of the service required. Lord & Taylor found five of their sub-stations nearest the store were costing too much to maintain and did away with them and substituted a direct delivery from the store. The company still maintains three sub-stations, one in Newark, one in Mt. Vernon and one in Far Rockaway. These handle a volume of business sufficient to make their maintenance cheaper than the use of a larger number of trucks operated direct from the store because of the long mileage between the store and the first delivery and the last delivery and the store.

Halle Bros. in Cleveland and the Jordan-Marsh company in Boston find it cheaper to handle the delivery of packages to the far-distant suburban points and resorts during the summer months by contracting with a delivery concern and

One of the Commerce 1,500-pound delivery cars in the service of the Reiss Mercantile Co., Mobile, Ala. Note the great clearance between the rear wheel and its fender

with local expressmen respectively. This is because the volume of business done is not great enough to warrant the establishment of sub-stations or of modifying the delivery routes direct from the store to handle it.

The proper number of trips to be made per day in the various sections depends upon the volume of goods to be delivered and the quickness with which the packages must reach the purchaser in order to meet the competition of other stores.



One of the six 1-ton Armledera which has been used by the Mabley & Carew Co., Cincinnati, O., for the past 3 years. The Mabley & Carew company has a fleet of ten trucks which replaced eighteen wagons and which have enabled the company to serve a much wider territory and obtain a greater number of customers

The delivery zones may be divided into three sections, as follows: 1—Central section. 2—General residence section. 3—Suburban section.

The majority of the large department stores make from two to three trips per day in the central section. Gimbel Bros. in New York make four trips a day in this section, the first three being made with electrics and the fourth with a gasoline truck. This fourth trip is in reality a special to deliver all the packages which missed the third regular trip. This vehicle does not run on any given route. It delivers all the goods in any one section of the city which it can cover in 1 or 2 hours. If this cannot be done because the points of delivery are too far apart, another vehicle of like type is used.

In the peak-load periods, the number of trips in the central section is generally increased by one, or from two to three, or from three to four, depending on the local conditions.

Practically all of the concerns make two trips in the residence section and one in the suburban territory.

The zones or mileage radii of the above three sections depend somewhat on the layout of the particular city in which the store is located, but generally speaking, the central section is within from 5 to 10 miles; the residence section from 10 to 15 miles, and the suburban from 15 to 30 miles, or up to 50 or 60 miles from the store if sub-stations are used.

Three 1-ton and one 5-ton B. A. Gramm motor trucks made by the Gramm-Bernstein Co., Lima, O., and sold to Siegel Cooper & Co., Chicago. The 5-tonner is used for furniture deliveries and for sub-station work and the 1-ton models in the package delivery service. Note the unusually large bodies fitted. These have both front and rear doors, the former being entered through the drivers' cabs

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## Local Geography, Traffic, Trade and Paving Conditions Affect Delivery

(Continued from page 23)

Transfers, which were formerly handled by a man at the mouth of the spiral chute, are now picked up at the main sorting table, where the belt dumps, and with will-calls and futures are thrown on a belt running back to the transfer department.

Sorting bins are concave, with hat racks above. Drivers' bins are double decked. The sorting bins enable writing up to be done economically and are a factor in getting loads off quickly, as drivers have to do only load routing and loading, with the helpers stationed in basement. Two helpers work with each driver in loading.

Autocars are used for suburban work. Solid tires being favored because of absence of punctures, the time saved the driver more than offsetting wear on the truck.

For city work electrics of 1,000 pounds capacity are used. These have been found all right on hills, despite the fact that they are high and steep.

### Bodies for Convenience—Not Beauty

Bodies have wire screen sides and tops with rails around and a ladder up the rear 8 inches above the platform. The top deck is used for linoleum, baby carriages, etc. The screen body helps to speed up packing, being always light within, and lets driver see in every direction from his seat, and by actual tests is a gasoline saver from diminished air resistance. These bodies are concave below the wire, so that customers may see the load better, which constitutes a good advertising feature. The load is accessible from either front or back and the bodies are locked back and front.

At Bullock's department store the shipping room is also in the sub-basement, but the trucks are loaded in an alley at the rear of the store.

Packages are thrown on a belt at the wrapping desks on the first floor and basement. On upper floors they are taken to central wrapping desks and thrown in a spiral chute, dropping to the belt in sub-basement.

Sorting and drivers' bins are in the basement on practically the same layout as adopted in the Broadway Store. The trucks all load in the alley at the rear of the first floor, so all loads have to be trucked to an elevator and run out into the alley. Expansion of business will be likely to force a revision of the system in this respect at no very distant date.

### Pneumatic Tire Advantages

Suburban deliveries are cared for by five White 1,500-pound trucks and city deliveries on ten 1,000-pound G. V. worm-driven electrics. Pneumatic tires are used on White trucks, solids on the electrics. Pneumatics give 50 per cent more speed in suburban deliveries. Extra tires mounted on demountable rims can be put on in 5 minutes if a puncture occurs.

The splendid county highway system permits rapid driving without shaking up the load, and the trucks are run up to the legal speed limit, 25 or 30 miles an hour, the California law being fairly liberal.

Furniture deliveries are made on White 3,000-pound trucks, of which there are two.

Bodies are all of the full panel type, the highest-priced bodies built, having a limousine finish similar to those of Lord & Taylor, New York, to conform to the store's general standards.

Three motorcycles are used for specials, the boys who make the specials owning the motorcycles they ride.

Hamburger's Department Store has an internal system the equal of that used by the Broadway Store.

Assembling desks are on each floor beside a big double track spiral chute, with openings for transfers above those for regular deliveries. Transfers come down one track of this chute and go to the transfer department at one side, and regular deliveries come down the other tube and are moved by the belt to the sorting table. Sorting bins are located on each side of the belt conveyor, the packages being written up from the sorting bins and then placed in the drivers' bins. Drivers route their packages on the floor, with the trucks close to the wall, so that the helpers have to walk only about three steps with each package instead of having the wagon backed up to the load after it is routed, as in the Broadway Store. The helper passes the parcels to the driver, who loads the truck.

The delivery department is in the basement and was reached by an incline in the horse days. When trucks were adopted, however, the store put in a 10-ton elevator opening directly on the street.

### Combination Bodies for Suburbs

For suburban work Autocars of 1½-ton capacity are used, and for city work Fords, some horses, which will soon be replaced by trucks, are employed, and bicycles for specials. Pneumatic tires are used on the Fords and on suburban trucks using principally boulevards; for those routed over the ordinary roads for considerable mileage solid tires are used. On the boulevards pneumatics allow speed with less jar, the greater tire expense being offset by less injury to both the truck and goods.

Suburban truck bodies are open in the upper half, allowing loading of springs, furniture, beds and other bulky goods. It is rarely that the furniture trucks are sent over the same routes as one of these. An Autocar is used for all heavy local stuff.

The Fords never are required to carry over 700 pounds. A fairly long body holds the Ford down behind, and in winter they are good mudlarks. The average trip for a Ford is 50 miles, 150 stops. They travel fast, and this lets them start their morning delivery late enough so they do not bother late breakfasters at the beginning of their routes. All the Fords have closed panel bodies.

Specials are delivered by Fords and bicycles. Bicycles are able to worm through traffic faster than full-width vehicles, but the extensive use of bicycles is a constant source of risk to delivery boys and the public and an unmitigated nuisance to other vehicles. It is tolerated more in Los Angeles than in any other city.

The J. W. Robinson Co. moved recently into a magnificent mammoth new building, in one end of whose basement the delivery department is located. It is not fully in operation as yet, however, carpenter work on the bins being incomplete, and the exact method of operation not fully determined. The trucks travel down and up a grade to delivery basement. A big freight elevator is used to take loaded trucks of incoming freight up to receiving room on an upper floor.

First floor wrappers drop parcels on a belt, while those on upper floors drop them down a spiral chute.

The Robinson store has one up-to-date G. V. electric, one Vim truck and a miscellaneous fleet of touring car remodels, no two of the same make except two or three Fords. Horses are not used for close-in downtown work, for this is handled by bicycles, but instead they serve residence and apartment districts just outside the business district.

Typical practice in Los Angeles is to make four deliveries per day in the business section. Some stores, however, have so little trade in the business section that such are only handled as specials. Others deliver hourly in this zone.

In all but the downtown district all portions of the city get delivery twice a day. Some of the stores give three deliveries a day to the hill sections and apartment house neighborhoods. Purchases up to 2:00 p. m. are usually delivered the same afternoon. This spells efficiency both within and without the stores.

### Boulevards Aid Quick Delivery

Suburban delivery is made once per day. The most distant suburb on a regular route is 28 miles from the business center. On occasion deliveries have been made to Riverside, southeast of the city, 80 miles away, the round trip taking 6 hours. This was made possible by the existence of excellent boulevards all the way with the exception of about 10 miles.

Special delivery to residences is waning. This is because customers have learned that motor delivery is swift and reliable, whereas formerly, when horses were used, they knew too well how frequent were delays and how slow such delivery was at best, and so to make sure frequently ordered special delivery. Customers in districts which still are served by horses often ask for motor delivery, feeling that when they get anything less they are not being as well treated as customers in the motor zones.

Sub-stations are unknown in the Los Angeles dry goods business. One reason for the highly-developed shipping room systems which prevail is the impossibility of using the sidewalks for loading. The passenger car traffic is great, even leaving out the jitney bus crush, and customers insist on ample parking space for their cars which they could not have if delivery vehicles monopolized a good portion of the frontage for considerable periods of the day.

## Start of Truck Tour Opening of Electric Show

(Continued from page 15)

owing to its stiffness it prevents a zigzag course which is often taken by two-wheeled trailers over rough or crooked roads or at speed. A special bracket is designed for easy application to the Ward 750-pound electric or to other vehicles. The wheels and springs are the same as used on the front axle of the Ward Special and the same solid tires are applied.

Among the Edison batteries shown was the new G4, specially designed for the Ward 750-pounder.

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Exhibit of Ward Motor Vehicle Co. at the Electrical Exposition and Motor Show, now going on in New York City

## Always on the Job

"I have a very successful business," says E. M. Avery, a former hotel clerk and now proprietor of the Hartford, Farmington and Unionville express. Three years ago Avery was clerk at the Elm Tree Inn, a famous hostelry on the Hartford-Farmington road. During the lulls in trade he did some tall thinking. He longed for the out-of-doors and the incidental freedom. He arrived at the conclusion in the course of his meditations that he was wasting his time as a hotel clerk.

He accordingly embarked in the motor express business. He talked the matter over with Charles O. Britton, of Hartford, executive head of the Britton company and distributer for Federal motor trucks. Avery purchased a Federal. That was over a year ago. Today he is a successful business man.

"My business today," he said, "is three times what it was when I started. I need another truck. I will install one this summer. Then I will make two trips daily between Hartford and Unionville."

"How much does it cost you to operate your truck?" was asked by THE COMMERCIAL VEHICLE representative. "Why I do not bother about the cost. I am too busy. This I do know: In the 14 months that I have operated this truck I have never had it down for repairs. It has yet to be overhauled. I take good care of it. I do not abuse it. It is always ready. It has not cost me a cent aside from oil, gasoline and tires since I had it. Yes, I carry insurance. I use 5 gallons of gasoline and 1 quart of oil a day. The average miles per day is 50. I am more than pleased with the venture. It has been well worth while." Incidentally Avery has the distinction of operating the pioneer motor truck in express business between Hartford and Unionville. He does much general trucking about Unionville and frequently carries parties from one town to another.

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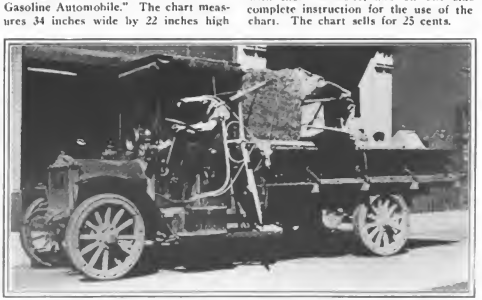
**"Location of Ignition Troubles Made Easy,"** is the subject of a wall chart recently issued by the Norman W. Henley Publishing Co., New York City, one of a series of seven such charts by Victor W. Page, M.E., author of "The Modern Gasoline Automobile." The chart measures 34 inches wide by 22 inches high and folds into 8½ by 5. It consists of a drawing of a four-cylinder group equipped with all common forms of ignition, comprising a magneto, a storage battery, a dry battery, a coil, a timer, two sets of spark plugs, suitable switches and all wiring. Section sketches show the interior construction of the magneto, the storage battery, the timer and the coil. Each part is labeled and the circuits are easily traced.

On each side are tables of troubles with their remedies, and on one side complete instruction for the use of the chart. The chart sells for 25 cents.



E. M. Avery's 1½-ton Federal used in the express business between Hartford and Unionville, Conn.

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Fig. 1—I. H. C. chain-driven model of ½-ton capacity, showing lower wheels

## I. H. C. Has Lower Wheels

CONTINUING the two-cylinder water-cooled model which has been built for several years, with refinements, the International Harvester Co. has recently announced lower wheels for it than previously used. Both front and rear tires are now 36 inches in size.

The chassis lines up now as follows:

| | |
|---|---|
| Capacity | 1,000 pounds |
| Price | Not given |
| Wheelbase | 90 inches |
| Tires, front | 36 x 2 |
| rear | 36 x 2½ |
| Drive | Double chain |

Motor refinements consist of the addition of a governor under seal, driven from the motor and of the centrifugal type. The motor is as follows:

| | |
|---|---|
| Bore | 4½ inches |
| Stroke | 5 inches |
| S. A. E. horsepower | 16.2 |
| Speed, m. p. h. | 17 |

The two horizontal cylinders are offset on the crankcase and set longitudinally, the L-head valve chambers uppermost. A centrifugal pump forces the water through a finned-tube vertical radiator in front of a short dummy hood covering the gasoline tank.

The flywheel, clutch and gearset are to the right of the chassis and the engine to the left; the carburetor being placed to the extreme left below the chassis frame, where it is easily reached. The pump and magneto are both above the crankcase, under the driver's seat.

Either a Heinze or Bosch magneto is supplied, operating as a dual system in conjunction with dry cells, with hand spark advance.

The clutch is of the contracting band type and the gearset of the constant-mesh individual-clutch type, affording two speeds. From the gearset a single roller chain takes the drive to the jackshaft, from whence final drive is by double chains. The entire power plant, including the jackshaft, is supported on a pressed steel frame hung below the pressed steel mainframe.

The jackshaft is of the non-floating exposed type, the differential carrying a large band brake operated by the foot.

Control is on the right side, the steering wheel being to the right and the clutch and gearset being operated by a single lever to the right.

This control is unique, the single lever performing two functions by means of a two-directional movement. The main lever is vertical, but has another lever jointed to it at right-angles. The operator grasps the handle of the horizontal lever and may operate the clutch by raising or lowering this lever. Pulling the two levers forward or back engages the low and high speed respectively, while release of a small ring latch permits it to be moved back into reverse.

A secondary set of brakes, acting on the rear wheels, is operated by a lever provided with a ratchet.

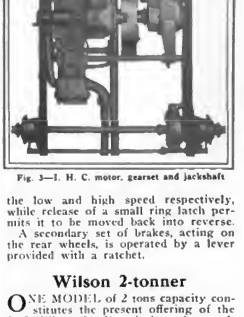

Fig. 3—I. H. C. motor, gearset and jackshaft

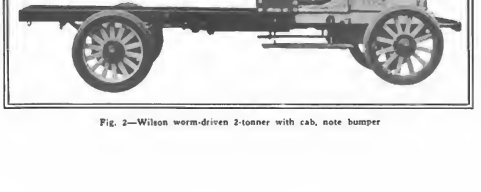

Fig. 2—Wilson worm-driven 2-tonner with cab, note bumper

## Wilson 2-tonner

ONE MODEL of 2 tons capacity constitutes the present offering of the J. C. Wilson Co., Detroit, but other models are to appear later. Since the first announcement of the Wilson 2-tonner, the chain drive with which it was originally provided has been discontinued and it is now made with worm drive. In brief, it is as follows:

| | |
|---|---|
| Capacity | 4,000 pounds |
| Price | $2,000 |
| Wheelbase | 141 inches |
| Tires, front | 36 x 4 |
| rear | 36 x 4 dual |
| Drive | Worm |

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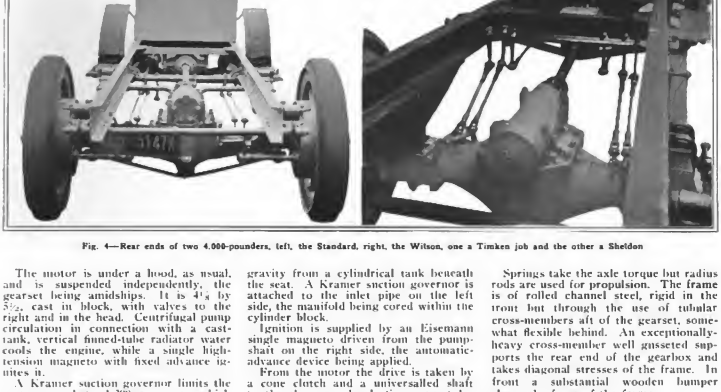

Fig. 4—Rear ends of two 4,000-pounders, left, the Standard, right, the Wilson, one a Timken job and the other a Sheldon

The motor is under a hood, as usual, and is suspended independently, the gearset being amidships. It is 4¼ by 5½, cast in block, with valves to the right and in the head. Centrifugal pump circulation in connection with a cast-tank, vertical finned-tube radiator water cools the engine, while a single high-tension magneto with fixed advance ignites it.

A Kramer suction governor limits the motor speed to 1,200 r. p. m., which equals 15 miles per hour in the high-gear reduction of 8½ to 1.

A cone clutch connects the motor with a shaft which leads to the gearset amidships, the latter being a conventional selective assembly affording three speeds and reverse. Final drive is by a single shaft with two universals to the worm-driven rear axle. Springs take both drive and propulsion. Control is from the left side, with central levers.

## Standard 2-tonner

FULFILLING the prophecy of THE COMMERCIAL VEHICLE of January 1 that 2-ton inclosed-drive trucks for $2,000 would develop, the Standard Motor Truck Co., Detroit, Mich., has just brought out such a vehicle.

The 2-ton Standard is the lightest vehicle which this concern has built and came as a result of investigations by the Standard company which showed that 1½-tonners were too often purchased for 2-ton loads, so that while it will occupy much the same field as the standard 1½-ton size, it is built to sustain greater loads than should be imposed on the latter vehicles. Details follow:

| | |
|---|---|
| Capacity | 2 tons |
| Price | $2,000 |
| Wheelbase | 140 inches |
| Tires, front | 36 x 4 |
| rear | 36 x 6 |
| Drive | Worm |

The motor is mounted separate from the gearset instead of as a unit power plant, this construction avoiding the division of the driving shaft to prevent whipping. Its details follow:

| | |
|---|---|
| Bore | 4¼ inches |
| Stroke | 5½ inches |
| S. A. E. horsepower | 27.2 |
| Speed, r. p. m. | 1,100 |
| m. p. h. | 15 |

Valves are to the left of the cylinder block and cooling is effected by centrifugal pump circulation through a square-tube radiator with a sheet-metal case.

A Schebler carbureter is used, fed by gravity from a cylindrical tank beneath the seat. A Kramer suction governor is attached to the inlet pipe on the left side, the manifold being cored within the cylinder block.

Ignition is supplied by an Eisemann single magneto driven from the pump-shaft on the right side, the automatic-advance device being applied.

From the motor the drive is taken by a cone clutch and a universalled shaft to the three-speed selective gearset located just abaft the cab, from which a double-universalled shaft transmits it to the Timken-David Brown worm-driven axle. Gear ratios are as follows:

| | |
|---|---|
| In low | 24 to 1 |
| In second | 16 to 1 |
| In high | 7¼ to 1 |
| In reverse | 27 to 1 |

Springs take the axle torque but radius rods are used for propulsion. The frame is of rolled channel steel, rigid in the front but through the use of tubular cross-members aft of the gearset, somewhat flexible behind. An exceptionally-heavy cross-member well gusseted supports the rear end of the gearbox and takes diagonal stresses of the frame. In front a substantial wooden bumper closes the front of the frame.

Fig. 5—Plan view of Standard 2-ton chassis. Note gearset location

Brakes are all internal, both sets acting for the full width of the same drums. Wheels are wood with square spokes. The steering gear for American sale is on the left with central levers. The throttle lever is below the steering wheel.

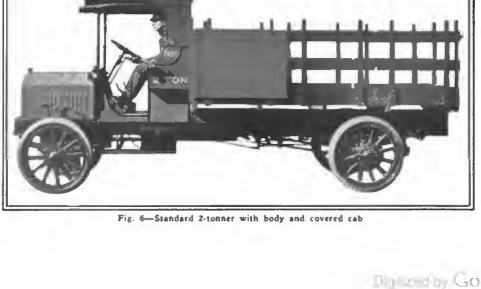

Fig. 6—Standard 2-tonner with body and covered cab

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# The Readers' Forum

## GROWTH OF WORM-GEAR DRIVE

### Chain Has Fallen Off Consistently in the Past 3 Years

To the Editor, COMMERCIAL VEHICLE: What percentage of commercial vehicle manufacturers used worm drive, chain drive, bevel gear and internal gear drive during the years 1913, 1914 and 1915?

Our idea is to find out what has been the increase in the use of worm gears and any assistance you can give us will be appreciated.—Chainless, Philadelphia, Pa.

Figures on the trends of design are published annually by THE COMMERCIAL VEHICLE in its January 1 issue. These cover the models announced at that date for the ensuing year, thus the most up-to-date figures obtainable until next January are those up to January 1, 1915. Since then there have been many changes in drive. Both worm drive and internal-gear drive have made wonderful strides, so that the figures which applied last January do not represent the true condition today. However, the figures for the past 3 years appear below:

| Year | Worm | Chain | Bevel | Internal *Double gear reduction |
|---|---|---|---|---|
| 1913 | 15⅝% | 79% | 11% | ... 5% |
| 1914 | 9 | 68½ | 12 | ... 9 |
| 1915 | 21¼ | 58½ | 10 | 2½ 7¼ |

*Internal gear included in 1913 and 1914.

The above figures are computed on a basis of models offered, and neither on a basis of trucks in use nor manufacturers offering the different forms of drive.

The 1916 offerings will show a preponderance of worm- and internal-gear-driven models.

## HEAVY TRUCKS FOR DRY GOODS

### Use of Larger Capacities Confined to Stores in Big Cities

To the Editor, COMMERCIAL VEHICLE: I have been much interested in the disposition of trucks in different industries by percentage of sizes used. I note that the summary on page 7 of your October 1, 1915, issue omits vehicles of greater capacity than 2 tons, and yet on page 11 I note that Gimbels have 3-ton and 3½-ton trucks and I was under the impression that they had some larger-sized Alcos which were not mentioned. On the same page I note that Wanamaker is credited with 3-ton trucks in both Philadelphia and New York and both Lord & Taylor and the Eleto Co. with 5-tonners. On page 13 I note that the Marshall Field equipment includes some 3-tonners.* . . . All of this information either yes in your articles or must have been known to your staff, and I would like to ask why it was that the capacities above 2 tons were not included in the summary on page 7?

2—I take this opportunity to ask also if you have the distribution of vehicles by percentages of the various sizes in other businesses?—Morris A. Hall, Bridgeport, Conn.

The table on page 7 of the October 1 issue explains itself. The fact that some 2 dozen or more large stores in the principal cities of the country use 3- and 5-tonners in no way contradicts the fact that the many hundreds of smaller stores throughout the country in the smaller cities do not use heavy trucks. Furthermore, the summary on page 7 is a summary of a particular investigation carried out by THE COMMERCIAL VEHICLE and purports to be nothing more nor less. The replies from this investigation are on file and may be inspected at the office of publication. None of them contain any reference to higher capacities than 2 tons, the latter size representing but 3¼ per cent of the whole.

The table contained the statements that the data was secured from investigations in seventy-five cities in thirty-six states in all sections of the country and embraced cities of from 17,000 to 735,000, the latter city being St. Louis and the only one of its class. Obviously when one talks about the stores in New York, Philadelphia, Chicago and Boston, he discusses a different field altogether.

Trucks of greater capacity than 2 tons are not used in the stores in cities of moderate size because the goods to be delivered never exceeds 2 tons in weight for any one route; in fact, very seldom reaches this weight except where groceries, crockery and furniture are handled extensively.

Trucks of 3, 4, 5, and even greater tons capacity are used by the great metropolitan stores, not for delivery, but for transfer, for hauling the loads of from four to a dozen individual delivery vehicles at one trip, to be later distributed among the vehicles which deliver the goods, at a sub-station some distance out from the main store. None but the larger stores employ sub-stations of this sort.

2—No such figures are obtainable. They are impossible to procure and any estimates now current are necessarily based largely on guesswork.

*Portion of Mr. Hall's letter omitted for brevity, the omitted part continuing further citations of heavy-truck use by large department stores.

## COST ACCOUNTING AND SYSTEM

### Delivery Superintendent Wants Articles on Efficient Dry Goods Schemes

To the Editor, COMMERCIAL VEHICLE: In looking over an old number of THE COMMERCIAL VEHICLE I saw mentioned an article prepared by your Mr. M. C. Horine, entitled "The Necessity for and Methods Employed in Commercial Cost Accounting." Will you kindly refer me to what issue this article appeared in?

I have recently accepted the position of delivery superintendent for the J. L. Hudson Co., of Detroit, and we are contemplating the removal of our delivery department to our new garage, which which be completed inside of a month.

I would like to obtain the latest and best systems of cost accounting in the garage, also information on figuring depreciation on motor vehicles.

Have you on file the systems of handling deliveries of any stores in the country who operate their delivery department outside of the establishment? Understand that the Rosenbaum Co. in Pittsburgh does this and am leaving tonight for Pittsburgh to look this over.—J. A. Manley, delivery superintendent, J. L. Hudson Co., Detroit, Mich.

The cost-accounting system for horse vehicles, gasoline trucks and electric trucks prepared by THE COMMERCIAL VEHICLE was published in the issue of September 1, 1914, and also discussed in later articles. The Rosenbaum system of package sorting and routing in a warehouse separate from the main store was described and illustrated in THE COMMERCIAL VEHICLE of September 1, 1915.

## MAKER OF HARVEYIZED STEEL

### Rifle-proof Armor Plate for Trucks Made in Pittsburgh

To the Editor, COMMERCIAL VEHICLE: Kindly advise us where Harveyized steel may be purchased, also the manufacturer of this product.

This steel is mentioned in THE COMMERCIAL VEHICLE of September 1, on page 7.—W. R. Hudson, factory manager, Troy Wagon Wks. Co., Troy, O.

Harveyized steel is manufactured by the Carnegie Steel Co., Pittsburgh, Pa., and may be bought at any office of the United States Steel Corp.

It has the ability to withstand rifle fire at 500 yards and in tests at Plattsburg resisted it at 200 yards until the vibration crystalized the plates tested.

The Harvey process is merely a surface-hardening operation. Nickel-chrome or tungsten steels are generally used when the surface is to be Harveyized

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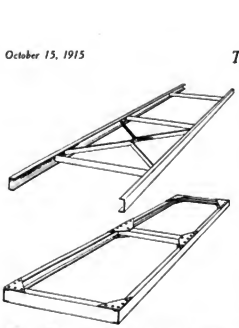

Fig. 1—Flexible and rigid frame construction; above, the flexible type; below, the rigid form

## FLEXIBLE FRAMES TWISTABLE

### Flexibility in Truck Frames is Ability to Warp, not Sag

To the Editor, COMMERCIAL VEHICLE: Please explain to me the difference between a so-called flexible frame and the common or garden variety which, I must infer, is characterized by a certain amount of rigidity.

2—Why is there any advantage in having a flexible frame? It appears to me that the purpose of a frame is to give rigidity to the chassis. I know I would not care to live in a house with a flexible frame. Even the frame of my bed is not flexible.

3—As I understand it, the purpose of a frame is to hold the component parts in their proper relation to each other and to prevent their getting out of place and binding the shafts, bearings, etc.

4—Why should one want a frame which will sag in the middle like a sway-backed horse?—Julius W., Minneapolis.

1—The difference between the flexible frame and one that is not flexible, but rigid, is that the flexible frame is so constructed that it may be distorted to some extent under the influence of uneven roads, while the rigid frame may not. The difference in the relative levels of the different wheels when one or more is passing over obstructions makes it necessary that some flexibility be provided between the body and the wheel so that one wheel may rise without lifting its mate. In the rigid frame the only flexibility provided is the springs, which are usually more deeply cambered for this reason. In the flexible type the frame itself may warp, thus taking some of the stress from the springs and making it possible for the latter to be flatter than is expedient with a rigid frame.

Structurally, the flexible frame usually, though not always, has finer-drawn lines on its side-members, which are required to take most of the vertical loads and has few cross-members. The latter, in the true flexible type of frame are so joined with the side sills that they may twist slightly.

The rigid frame is often made of structural steel instead of pressed steel as almost always used in flexible frames, and is by far the simpler frame to build. It has plenty of stiff cross-members and these are rigidly riveted to the side sills.

To prevent horizontal distortion, rigid frames are provided with gussets or corner braces, while flexible frames use diagonal steel straps, which permit vertical warpage at the corners but hold the frame horizontally stiff.

2—Flexibility in almost any mechanical application means greater strength for given weight. A wire formed into a spring will sustain a shock that would break it were it stretched taut. If vehicles had no springs they would be unable to withstand the punishment they receive on rough roads. The secret of the spring is that it converts a sudden blow of great intensity and short duration into an easy pressure of mild impact and long duration. A man might sustain a pressure of 100 pounds on his head, yet be instantly killed if a 25-pound weight were dropped upon him.

If a frame may give to the distorting influence of the road, the stress will be distributed fairly evenly over its entire structure, but if it remains rigid, the blow will be confined locally, where its destructive effect will be concentrated.

It is not possible always to apply the same reasoning to a road vehicle as to a stationary structure, however, even bridges are now made with a great deal of flexibility. The great suspension and cantilever bridges are constructed so that they may be distorted by their own expansion and contraction, by the shifting of their foundations, etc.

3—The purpose of a frame is to maintain a given relation between parts of a chassis, it is true, but there is nothing to prevent a slight alteration of this relation if proper provision is made to avoid strain. Motors and unit power plants are mounted flexibly, on three points, on spring sub-frames, universals are used in the driveshaft, and various parts are attached to the frame on pivots to avoid any evil effects from frame warpage.

4—Flexible motor truck frames, when properly built, do not sag in the middle. This is a different sort of flexibility, peculiar to the buckboard. Motor truck frame flexibility is the ability to twist without racking or sagging.

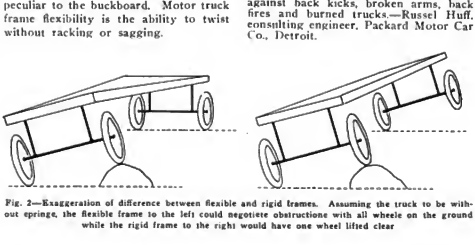

Fig. 2—Exaggeration of difference between flexible and rigid frames. Assuming the truck to be without springs, the flexible frame to the left could negotiate obstructions with all wheels on the ground while the rigid frame to the right would have one wheel lifted clear

## STARTERS FOR TRUCKS

### S. A. E. President-elect Tells Why He Favors Electric Systems

To the Editor, COMMERCIAL VEHICLE: As an accessory to the motor truck, the electric starter has economic advantages that far offset the initial cost and trivial maintenance expense of the system.

There are many notable advantages accruing from the use of the modern self-starter which many truck owners lose sight of. The starter of today has been so perfected that when once properly installed on the truck it may be forgotten.

A casual inspection tour of any city will quickly establish the fact that most drivers allow their motors to stand with the engine running idle for long periods. This is expensive, because the idling of the average 3-ton engine costs the truck owner ½ gallon of gasoline an hour and a great deal of engine oil.

This idling produces a more rapid deposit of carbon in a motor than any other one thing. The high vacuum caused by idling continually sucks oil up past the piston rings, onto the walls of the cylinder and the tops of the pistons. After a long period of idling the excess of oil deposited above the piston burns up when a load is applied to the engine—part of it appearing at the exhaust in the form of blue smoke and the rest remaining on the cylinder walls and piston in the form of solid carbon.

Excessive idling, especially in cold weather, is oftentimes the result of difficulty in starting. A driver will allow his motor to run in this manner for an hour or more in the winter time rather than take the chance of wasting another hour in his efforts to start the motor after it has become cold.

The electric starting system has the great advantage of being a constant source of electricity for keeping the battery charged. Electric headlights and electric swivel searchlights allow the driver and helper to make faster deliveries after dark, by giving them a good light to drive by and a searchlight for picking out streets and house numbers.

Electric lights can be cheaply installed in express bodies, van bodies, bus bodies and any other types where good lights are a convenience.

A distinct economy results by saving the time of the driver through this device which positively starts his motor quickly and efficiently in either hot or cold weather. The time saved by having electric lights for faster driving and faster delivery work is considerable, and there is an important reduction of gasoline, oil and carbonization costs. The starter also is cheap, positive insurance against back kicks, broken arms, back fires and burned trucks.—Russel Huff, consulting engineer, Packard Motor Car Co., Detroit.

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# Accessories for the Truck

## SHELDON WORM-DRIVEN AXLE FOR 5-TONNERS

Designed for a tire load of 18,000 pounds, including the weight of the chassis, body and dead load, the 5-ton worm-driven motor truck axle just brought out by the Sheldon Axle & Spring Co., Wilkes-Barre, Pa., closely follows Sheldon practice, being of the semi-floating type with its overhead worm mounted on ball bearings.

Ball bearings are used to take both the radial and thrust loads in the worm-gear carrier. The thrust is taken by a self-contained double-acting thrust bearing and the radial load by two single-row annular bearings. The differential is mounted on single-row annular bearings. Separate thrust bearings are used to take the differential and axle shaft side thrusts. Either double-row annular bearings or straight roller bearings may be used at the wheels.

The housing is made of cast steel in three pieces with a cover for the worm. The central and end portions of the housing are hydraulically pressed together over heavy nickel steel tubing extending from the differential to the wheel bearing and riveted in place. The outer ends of the axle housing are bell-mouthed to resist distortion due to the hydraulic pressure when mounting on the tubing and to increase the possible size of bearing.

Spring pads are integral with the housing. Brakes are on the rear wheels. The axle shafts are tapered to give a structure of uniform strength at all sections of the shaft. The shaft diameter is 3½ inches at the outer bearing, the taper running from the bearing collars to the differential.

A feature of the wheel construction is the use of a hollow hub, the inner face of which is tapered to fit the taper of the end of the axle shaft. The inner face of the hollow hub is cut away at the center so that it bears against the axle at each end but not in the middle. This prevents the hub from rusting onto the axle end.

The wheel bearing, which is mounted in the bell mouth of the axle housing, is prevented from moving laterally along the axle shaft by means of two nuts, one inside of the other, the inside one keeping a key in the axle shaft up against the until the wheel is forced off.

inner race of the bearing which in turn bears against a shoulder on the axle. The outside nut is of the castle type and is keeping the inside nut up against the key as well as the hollow hub up tight on the axle shaft. This construction differs from previous Sheldon practice. It is shown in Fig. 1, which gives plan and end views of the axle unit.

The 5-ton model is also provided with a wheel-pulling attachment similar to that used on previous Sheldon units. This consists of a stud which is screwed in through the center of the hub cap until it touches the end of the axle shaft. As it is screwed in further, the wheel is forced off the axle, the wheel bearing remaining in place in the axle housing. The complete operation consists of removing the wheel hub cap, taking off the castle nut, replacing the cap, inserting the stud in the cap and screwing it in

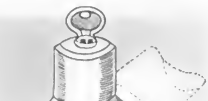

Fig. 2—The Parkin safety lock for preventing gasoline vehicles from being stolen. It is inserted between the carburetor and intake manifold flanges

The spring pads are usually large, allowing considerable leeway for attaching the springs, the maximum distance between spring centers being 49 inches with 4-inch springs. The wheel track is 74½ inches.

## PARKIN SAFETY LOCK

Designed to prevent the stealing of a motor vehicle, the Parkin safety lock, made by Parkin & Son, Philadelphia, Pa., can be attached to any type of gasoline vehicle and consists of a flat metal pipe flange with a butterfly valve that can be

Fig. 3—The Pioneer luminous match box, handy for use in garages. It is made of metal painted with an eradium compound

either closed or opened by means of a key inserted in a lock integral with the flange.

The device is placed between the inlet manifold flange and the carbureter and when the butterfly valve is closed prevents any mixture from reaching the combustion chambers of the cylinders. When the vehicle is in use and under power, the key is firmly secured within the lock and cannot be removed. To lock the device, the key must be removed. The vehicle cannot then be moved under its own power, and to be moved at all must be either pushed or towed. Each lock is mechanically different, so that no two keys will fit the same lock. The device is shown in Fig. 2.

## PIONEER LUMINOUS MATCH BOX

Throwing off a bright light throughout the night, the Pioneer luminous match box, made by the Pioneer Portrait & Picture Frame Co., Chicago, Ill., may be very conveniently used in small motor truck garages to enable drivers getting in late at night to immediately locate matches in the garages without lighting other matches or fumbling around in the dark. The device is made of metal, painted with a special preparation of an eradium compound which absorbs the

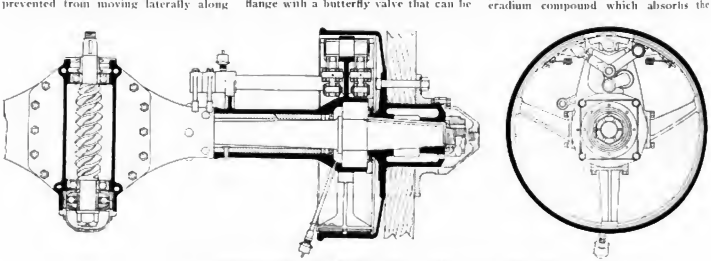

Fig. 1—Sectional views of the new Sheldon 5-ton worm-driven axle for motor trucks

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Fig. 4—The Glascow fender, shown as a fender at the left and as a bumper at the right

light during the day and gives it off in luminous rays at night. The luminosity of the eradium compound is believed to be permanent, as articles made 6 years ago are said to be as luminous today as when first made.

The device holds an ordinary 5-cent box of matches. It has a flat back with a hole at the top to hang it up on the wall. The bottom of the back is bent outward and upward for about an inch to form a trough. The front and sides of the box are made of one piece, bent to a U-shape, with a part of the front at the bottom split at the center and cut horizontally across the front, forming two flaps which are then bent outward at right angles to the back of the box to form the ends of the trough. The box of matches minus its cover is slipped through a metal cover provided at the top of the device, end down with the open part of the box toward the front. This permits the matches automatically to drop out of the box into the trough at the bottom of the unit, where they may be easily picked out.

## GLASCOW VEHICLE FENDER

Transformable from a motor vehicle bumper into a fender at will, the Glascow safety fender, made by the Glascow Safety Fender Co., Philadelphia, Pa., consists of two horizontal bars with a sheet of canvas rolled about one of them and attached to the other in much the same manner as the ordinary window shade.

Fig. 5—The Canton portable crane, designed for use in garages where weights of from 3,000 to 6,000 pounds must be lifted

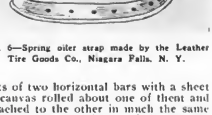

Fig. 6—Spring oiler strap made by the Leather Tire Goods Co., Niagara Falls, N. Y.

The device is attached to the front springs of any vehicle by clamps and is supported by means of four arms, two on either side. The upper arms on each side are stationary, extending out in front of the motor hood and vehicle wheel fenders, and carrying the horizontal bar about which the canvas is rolled. The other two arms are pivoted on brackets attached to the front axle and carry the second horizontal bar to which the free end of the canvas is secured.

When in use as a bumper the canvas is rolled up around one horizontal bar, the other bar touching it in the same manner as when a window shade is wound up at the top of the window. A push of a special pedal by the driver or the push of a button on the steering wheel causes the two pivoted arms to move downward, carrying with them the free horizontal bar and unrolling the canvas off the stationary one, thus forming a canvas protection in front of the vehicle, down to within 2 inches of the ground. There is a certain reserve amount of canvas on the fixed bar when the device is thus open, so that in striking an object the canvas forms a pocket to carry it until the vehicle can be stopped. The fender is shown in Fig. 4.

## TRUCK SPRING OILER STRAPS

Spring oiler straps made by the Leather Tire Goods Co., Niagara Falls, N. Y., are produced in sizes for all capacities of vehicles and consist of a belt-like leather strap and buckle with a ply of wicking on the inside. This wicking is impregnated with oil and the strap buckled around the spring just back of the clip which holds the leaves together. The oil feeds off the wicking to the sides of the leaves where it works between them when the springs are in motion.

The leather of the strap is specially treated so that it will not absorb any of the oil. The strap need not be taken off the spring when it is desired to put more oil on the wicking, this being done by sticking the end of the oil can spout into a hole out in the top of the belt. This hole is covered with a small piece of leather riveted to the strap.

## CANTON PORTABLE CRANE

Portable and constructed for use in garages or shops in which weights of from 3,000 to 6,000 pounds must be lifted, the latest model of floor crane made by the Canton Foundry & Machine Co., Canton, O., is geared so that one man can easily raise weights of that amount. The machine consists of a U-shaped base mounted on wheels, an upright curved to a horizontal position at the top and a chain and hook operated by a hand crank through a train of back gears or direct through one large and one small gear if the weight to be lifted is less than 3,000 pounds.

The base is mounted on two fixed cast iron wheels at the open end of the U and on a small fore-carriage with smaller wheels at the other end. A handle attached to the fore-carriage enables the crane to be steered and moved about. The U shape of the base permits the crane to be pushed up and around the object to be lifted so that the pull on the lifting hook is vertical.

The crane weighs 1,400 pounds and has a lift of 7 feet 6 inches. Its total height is 8 feet 9 inches and the width of the base, inside, 3 feet, and outside, 3 feet 8 inches.

## MORRIS DASH OIL INDICATOR

Designed to indicate whether the lubricating system of a motor vehicle engine is working, and adapted for both gear and plunger pump types, the Morris dash oil indicator, made by George W. Morris, Racine, Wis., consists of a special Y-shaped elbow inserted in the oil pipe and a piston valve in the elbow which is forced up off its seat when the oil is flowing and drops back when it is not. The device is mounted on the dash, one arm of the Y extending through it. The stem of the piston valve corks up and down in this arm, which is open at the end, permitting the stem to extend out of it for varying distances, according to the distance that the valve is off its seat. The distance which the stem protrudes indicates the amount of oil which is flowing in the system.

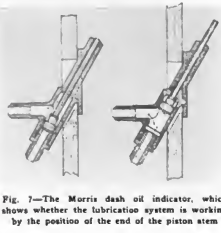

Fig. 7—The Morris dash oil indicator, which shows whether the lubrication system is working by the position of the end of the piston stem

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# Men and Makers

**STUDEBAKER CORP.**, Detroit, last week purchased the plant of the Peoples Ice Co., which adjoins its present plant No. 3. The ice plant is a hollow tile building constructed within the last 3 years, but it will be torn down and replaced by another structure more suitable for the Studebaker Corporation's needs. The concern has also leased a large tract of land adjacent to plant No. 3, upon which a testing plant will be constructed. In addition to the buildings which will be erected on these two tracts of land, the Studebaker corporation has had its construction engineers engaged for some time on the work of preparing plans for the enlargement of its present buildings. These include an extensive three-story addition to building No. 5A; a new forge shop, 62 by 264 feet, and an addition to the blacksmith shop, 62 by 140 feet. Both of the latter additions will be of steel, glass and tile. Another four-story building will be erected on the site of the old De Luxe structure, forming a part of plant No. 3. This will be of modern construction, 326 by 52 feet, and will be used for machining work. An extension of 35 by 120 feet will be made to the power house for the addition of new boilers. Other changes to be made at plant No. 3 include the extension and rearrangement of the freight shipping platforms.

**Sterling Motor Truck Co.**, Milwaukee, Wis., formerly known as the Sternberg Motor Truck Co., is building a large factory addition made necessary by a large increase in orders. The Sterling company has been doing a large foreign business and this, in addition with the large orders now being received from domestic sources, has made it necessary to almost double the capacity of the plant.

**Selden Motor Vehicle Co.**, Rochester, N. Y., the manufacturing concern for the Selden Motor Sales Co., has started work on an excavation for a new building to be erected at its plant on Probert street.

**Fred P. Brand Motor Co.**, Cleveland, O., has recently become exclusive distributor for Pierce-Arrow passenger cars and motor trucks in Cleveland and the adjacent Ohio counties. The new company will inaugurate a service station fully equipped to handle all classes of work. Mr. Brand has been identified with the sale of Pierce-Arrow vehicles in Philadelphia, Pa., for some time past. He was previously sales manager for the Autocar Co., Ardmore, Pa.; the Parish Mfg. Co., Cleveland, O., and the Kelly-Springfield Motor Truck Co., Springfield, O.

**Paige Automobile Sales Co.**, Houston, Tex., of which Herbert E. Neuhaus is president and general manager, has secured the agency for Lippard-Stewart trucks, made by the Lippard-Stewart Motor Car Co., Buffalo, N. Y., for Houston and the surrounding territory.

**A. W. Haile Motor Co.**, Buffalo, N. Y., a distributor for Studebaker motor vehicles in western New York, has recently taken over the entire three-story building formerly used by the Auto Dealers Clearing House in the same city. This is located directly behind the Haile company's present Main street quarters at 26 and 28 Goodrich street. The main floor of the new building will be utilized as a used-car department; the second floor as a service department and the third floor as a paint-shop. The parts department will remain in the older quarters.

**Storage Battery Service Co.**, 1532 Broadway, Seattle, Wash., has been appointed agent and service station for the Willard storage battery in Seattle and the surrounding territory. L. J. Ranney is manager of the firm.

**Gardner Machine Co.**, Beloit, Wis., manufacturer of disk grinders for metal working on motor vehicle parts, is erecting a shop addition providing about 5,000 additional feet of floor space.

**Acme Die Casting Co.**, Brooklyn, N. Y., maker of die castings for motor vehicles, has begun to increase its plant and has increased its capital stock from $125,000 to $200,000.

**Milwaukee Auto Engine & Supply Co.**, Milwaukee, Wis., is preparing to enlarge its plant and install additional equipment and for this purpose has increased its capitalization from $6,000 to $30,000.

**Kelsey Wheel Co., Ltd.**, Windsor, Ont., Canada, has prepared plans for the erection of a factory addition, 42 by 112 feet, part of which will be used as a garage and the remainder as six dry kilns for treating wood used in the manufacture of Kelsey wheels.

**Firestone Tire & Rubber Co.**, Akron, O., is preparing plans for the construction and equipment of a tire plant in Kansas City, Mo., calculated to cost approximately $200,000.

**Firestone Tire & Rubber Co.**, Akron, O., is rushing to completion the five additions to its plant in that city which are now under construction so that they may be finished before the snow flies. The new additions will afford abundant room for a general expansion of the Firestone business and it is expected that the present output of 7,500 tires per day will be increased to 12,000 daily, an increase of 60 per cent. Besides the five factory additions, the Firestone company is also erecting a clubhouse for its employes across the street from the factory, which is expected to be completed in the early spring.

**Ajax-Grieb Rubber Co.**, Trenton, N. J., will start work immediately on the construction of an additional factory building at its plant in that city. The new structure will be three stories in height, 200 by 350 feet, and will have 210,000 square feet of floor space.

**Kelly-Springfield Tire & Rubber Co.**, New York City, has recently purchased the plant of the Cataract Rubber Co., Wooster, O., to act as a temporary relief for its greatly increased production demands until the plant the company is now building in Akron, O., is completed.

**F. E. Erickson** has joined the organization of the United Motor Truck Co., Grand Rapids, Mich., as general superintendent of the plant. He was formerly with the Packard Motor Car Co., Detroit, and later with the Universal Motor Truck Co., Detroit.

**J. A. Inness**, formerly manager of the Philadelphia, Pa., branch of the Chase Motor Truck Co., Syracuse, N. Y., succeeded F. B. Porter as manager of the New York City branch of the Chase company on October 1. Mr. Porter, who has been manager of the New York Chase branch for the past 9 years, will take up another line of work. Mr. Inness' place as manager of the Philadelphia office, will be taken by C. E. Collard, formerly with the organization of the New York branch.

**F. A. Wickham** has resigned his position with Minneapolis, Minn., branch of the Studebaker Corp., Detroit, and is planning the organization of a company to handle motor vehicle tires. He was with the Studebaker branch organization for more than 5 years.

**J. R. Cooper**, formerly factory representative for Overland vehicles at Kansas City, Mo., has been appointed manager of the truck department of the Willys-Overland Co., Toledo, O., at Topeka, Kan.

**E. M. Taber** has been appointed manager of the truck sales department of Russel P. Taber, 338 Pearl street, Hartford, Conn., distributor of Reo motor trucks and passenger cars in the Hartford territory.

**Oscar R. Taylor**, formerly with the Port Huron Engine & Thresher Co., Port Huron, Mich., and also with the General Motors Co., Pontiac, Mich., has been appointed secretary of the Puritan Machine Co., Detroit, with which concern he has been connected for slightly more than a year.

**E. H. Hohenphal** has been appointed assistant sales and advertising manager for the Simms Magneto Co., East Orange, N. J.

**Harry Stoddard** has resigned as sales manager of the Simms Magneto Co.,

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East Orange, N. J., to become president of the Art Metal Construction Co., Jamestown, N. Y.

**J. B. Linerd** has recently been elected general sales manager of the Ajax-Grieb Tire Co., New York City. He has been connected with the Ajax-Grieb company for 2 years and before that was with the Goodyear Tire & Rubber Co., Akron, O. As general sales manager of the New York company he will have charge of all the salesmen of the Ajax-Grieb concern.

**Edward Campion**, formerly sales manager of the Marathon Tire & Rubber Co., Cuyahoga Falls, O., and former manager of the Seattle, Wash., branch of the Firestone Tire & Rubber Co., has opened a distributing station for Swinehart tires in Seattle. His territory takes in the states of Washington, Oregon, Idaho and Montana, and the Canadian province of British Columbia. His headquarters are at 909 east Pike street, Seattle.

**E. H. Beltzig** has recently been appointed office manager of the St. Louis, Mo., branch of the Firestone Tire & Rubber Co., Akron, O.

**W. J. Shay**, recently with the Judd & Leland Mfg. Co., and formerly with the United Manufacturers of New York, has been appointed manager of the Chicago branch of the Champion Spark Plug Co., Toledo, O.

**T. R. Hobert**, formerly with the Peerless Motor Car Co., Cleveland, O., is now in charge of the sales of Master carbureters in St. Louis, Mo. He has his headquarters at 5205 Delaware avenue.

**Robert Allan** has been appointed district manager for the Burd High Compression Ring Co., Rockford, Ill., in the northern California territory. Mr. Allan was formerly attached to the Dallas, Tex., office. He will make his new headquarters at 847 Phelan building, San Francisco, where he has taken offices and where he will carry a complete stock of piston rings.

**Firestone Homestead Outing**, held on September 18 last, at the old Firestone homestead at Columbiana, O., was attended by more than 200 foremen, superintendents and officials of the Firestone Tire & Rubber Co., Akron, O., who spent the day as the guests of H. S. Firestone, president of the company. Fifty passenger cars were drawn up at the Firestone plant early in the morning to take the guests to the old homestead, where a day of general jollification was spent in playing athletic games and having a good time.

**Five Hundred Firestone Salesmen**, branch managers, department heads and officials of the company attended the home-coming of the Firestone Tire & Rubber Co., held at Akron, O., last week. Special cars were run from many parts of the country, bringing in the tire men to attend the meeting. On September 29 the men were received in the executive offices of the Firestone plant and later a session was held in the assembly room, where a number of addresses on tire making and selling were made. At noon a luncheon was served in the restaurant of the company, which was followed by an inspection of the plant. An all-day session of the branch managers and department heads was held September 28.

**Goodrich Statements** may be issued quarterly instead of semi-annually by the Goodrich Tire & Rubber Co., Akron, O., the Goodrich officials having considered the plan for some time past. It is probable that the statement for the September quarter will be issued some time in November.

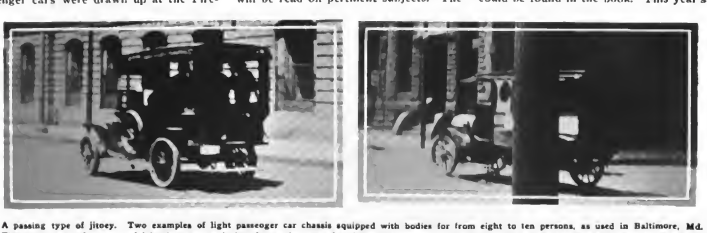
**Military Training for Packard Employes** is encouraged by the Packard Motor Car Co., Detroit, the directors of which passed a resolution at a special meeting held on September 7, to the effect that any Packard employe shall be granted leave of absence at any time he is eligible to take part in any military tour of inspection, naval reserve cruise or national guard encampment. It is also expressly provided that such leave of absence shall carry with it full pay for the entire period of military instruction and that the time shall not be deducted from the employe's regular vacation.

**"Taylor's Live Wire"** is the title of the house organ of the R. E. Taylor Corp., New York City, eastern distributer for Garford motor trucks, the first copy of which is only recently off the press. The initial issue is printed on white paper, 9 by 12, and contains twelve pages of reading matter designed to increase the sales of Garford trucks. The Garford Club, an organization of the salesmen of the R. E. Taylor corporation, has been formed and will hold weekly meetings every Saturday afternoon at which papers by prominent motor truck men will be read on pertinent subjects. The house organ will be published once a month on the nineteenth, and will contain all the news of the Taylor organization and also the papers read before the club, the first of which was presented by J. Edward Schipper, of *The Automobile*, and reported in THE COMMERCIAL VEHICLE of October 1, 1915.

**A Trip Record Sheet**, a small 5¼ by 6¼ sheet folded down the center, and designed for the purpose of enabling a tourist to keep track of his vehicle expenses while on a trip, has just been published by the Champion Spark Plug Co., Toledo, O. While originally intended solely for the use of passenger car owners, the sheet may also be conveniently used by the driver of a commercial vehicle to keep track of the daily gasoline and oil consumption and the tire record and mileage. Squares are ruled off for keeping these records on the right inside page of the folder. Directly below are blank spaces for each truck tire, with lines for the time put on, when taken off, the miles covered and the make. On the left inside page under the heading, What I Need, are the names of several articles which a motor vehicle driver might need with a dash after each entry for the make of the article desired. The folder is printed on heavy buff stock and is distributed gratis.

**Countersinks for Fitting Brake Linings** have recently been put on the market by Stevens & Co., New York City, in sets of three tools which are claimed to cut clean and accurate holes in the frictional material so that the rivets are properly recessed. The set comprises a 9/16-, ½- and 13/16-inch countersink for Nos. 7 to 11 flat head rivets. As the shanks of the countersinks are 5/16-inch in diameter, they may also be used in a hand drill or a power press.

**1916 Machine Press Catalog**, picturing and describing the various models and kinds of machine presses manufactured by the Standard Machinery Co., Auburn, R. I., is just off the printing press and contains 148 pages of reading matter with many illustrations. The Standard company manufactures machine presses of all kinds; drop hammers; rolling mills; rotary swaging machines; wire-drawing machinery; roller bearings; ball bearings and other special machinery. Each of these groups is described in different sections of the book. An index would aid greatly in finding just where any particular type of machinery could be found in the book. This year's



A passing type of jitney. Two examples of light passenger car chassis equipped with bodies for from eight to ten persons, as used in Baltimore, Md. These have proved unsuccessful in the great majority of cases because of their small passenger-carrying capacity and the overloading abuse to which they are put and the subsequent rapid depreciation of the chassis. The rear-entrance type of body also necessitates the use of an extra man or boy to collect the fares and prevent persons from stealing rides. A modern motor truck box of the pay-as-you-enter type with a carrying capacity of about twenty and operated by one man, costs less to operate per passenger carried than two vehicles of the type shown above with the four men necessary to operate them and it is for this reason that the former type of vehicle will survive in the bus business

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The ingenuity of Americans is well illustrated in the above picture, which shows how the Garford Motor Truck Co., Lima, O., has been able to keep pace with the large increase in foreign and domestic orders in a plant which is not large enough to meet the pressure of greatly increased production. Circus tents were set up on the grounds adjoining the Lima plant of the Garford company and the trucks assembled under these. Two of the tents housing a large number of trucks ready for shipment are shown above

catalog is the eleventh edition. It is printed on white paper, 6 by 9, with a dark grey cover.

**Record Grain Crops Affect the Motor Truck Business,** according to C. R. Norton, truck sales manager of the Packard Motor Car Co., Detroit, who points out that when it is considered that the cost of hauling grain 20 miles from the farm to the elevator by horses and wagons is often several times the cost of moving it in ships from Duluth to Buffalo, it is easy to understand why grain growers have welcomed the motor truck. According to Mr. Norton, many of the American growers have already provided themselves with motor trucks to handle the bumper crop they are now marketing and many others are contemplating early purchases.

**J. G. Perrin,** since last March consulting engineer for the Continental Motor Mfg. Co., Detroit, has just joined the organization of the Timken-Detroit Axle Co., Detroit, as chief engineer. Mr. Perrin was chief engineer of the old Lozier Motor Car Co. for 19 years. He is a member of the standards committee of the Society of Automobile Engineers and also of the Detroit section of that organization. H. W. Alden, former chief engineer and vice-president of the Timken company, remains as vice-president.

**G. O. Baldwin** has recently been appointed service manager of the Timken-Detroit Axle Co., Detroit. He formerly held a similar position with the Cadillac Motor Car Co., and also with the Studebaker Corp.

**J. M. Ready,** formerly assistant to Leslie Williams, manager of accounts of the Timken-Detroit Axle Co., at the Clark avenue plant, has been transferred to the Timken-Detroit Axle Co.'s metal products plant, on the east side of Detroit.

**F. H. Maisonville,** formerly assistant purchasing agent for the Packard Motor Car Co., Detroit, has just been appointed assistant to W. H. H. Hutton, Jr., director of purchasing for the Timken-Detroit Axle Co., Detroit.

**Leight Lynch** has been appointed production manager of the Lewis Spring & Axle Co., Jackson, Mich. Mr. Lynch was formerly a member of the organization of the Studebaker Corp., and more recently general manager of the American Top Co., Jackson.

**Parish & Bingham Co.,** Cleveland, O., contemplates increasing the size of its plant site at west One-hundred Sixth street and Madison avenue, by 10 acres. An adjoining tract of 10 acres has been bought and additional buildings will be erected. The present plant of the company covers a ground space of 22 acres.

**Willys-Overland Co.,** Toledo, O., will tear down its present administration building, the old Pope plant, to make room for a new factory structure. This latest addition to the production end of the business will compel the company to vacate its present quarters and the entire office staff will be moved to another building on Willys Park boulevard. The new factory structure will be seven stories in height, 373 feet long and 63 feet wide. It will contain 165,000 feet of floor space and will be of fireproof construction throughout.

**McGraw Tire & Rubber Co.,** East Palestine, O., will soon open direct factory branches on the Pacific coast in San Francisco, Cal., Los Angeles, Cal., and Portland, Ore. The new branches will be under the district management of S. L. Warner, formerly superintendent of branches, who will be succeeded in his former position by R. G. Nelson.

**Cosden & Co.,** Tulsa, Okla., will erect a plant in that city to cost approximately $200,000 for the manufacture of wax and cylinder oils.

**C. H. Connelly,** formerly manager of the Buffalo, N. Y., branch of the McGraw Tire & Rubber Co., East Palestine, O., has been transferred to Kansas City, Mo., as manager of the company's branch in that city. He will be assisted by G. J. Marshall, formerly assistant manager of the Buffalo branch.

**Detroit Commercial Car Co.,** recently organized in Detroit for the manufacture of the Detroit package delivery vehicle, will occupy part of the factory building of the Pontiac Chassis Co., which concern is supplying the chassis for the Detroit company.

**Motor Specialties Co.,** Muskegon, Mich., is erecting a new boiler room, 50 by 60 feet, and an additional machine shop. It is estimated that the new buildings will cost approximately $10,000 in all.

**Detroit Welding Co.,** Detroit, which began business about 18 months ago at Lieb and Larned streets, has opened a new shop at 814 west Jefferson avenue in the same city. The new shop is equipped to handle the welding of cast iron, aluminum, steel, brass, brake rods, steel tanks and other miscellaneous welding work.

**Aluminum Castings Co.,** Detroit, has completed its new shop which is now in use. The new building is 105 by 176 feet and is used for the machining of bronze bushings made from any one of its forty to fifty Lynux alloys.

**Auto Wheel Co.,** Lansing, Mich., has almost tripled the capacity of its plant since last March by the erection of additional buildings. These buildings include a two-story structure 60 by 180 feet; a new boiler room; ten new dry kilns; a large hydraulic hub press and other smaller additions. In March last, about fifty men were employed, while now the payroll is close to 150. The daily output is now forty sets of motor truck wheels and 225 sets of passenger car wheels. Orders on hand are said to be sufficient to keep the plant busy for the next 12 months.

## Commercial Motor Vehicle Agencies Recently Established Throughout the Country

| | | |
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| Ancon, Canal Zone | Autocar | O. M. Ewing |
| Auckland, New Zealand | Autocar | Chandler & Co. |
| Hamilton, Ont., Can. | Autocar | Wellburg & Carroll |
| Havana, Cuba | Autocar | Latin-American Trading Co. |
| San Juan, Porto Rico | Autocar | H. Clyde Gregory |
| Toronto, Ont., Can. | Autocar | Dominion Automobile Co. |
| Denver, Col. | Denby | Arthur C. Wagner |
| Los Angeles, Cal. | Kelly | Stone-Dacy Motor Sales Co. |
| Montreal, Canada | Knox | Victor Levesque |

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**The Ball Bearing of Highest Quality and Greatest Service Capacity Is Made In Sweden**

The exactions of the heaviest, and most difficult service in every industry where high powered machinery is used have been the tests that proved SKF efficiency and reliability.

We Build and supply SKF Ball Bearings for every type of engine or motor power—and the requirements of the most strenuous automobilist are covered by SKF Ball Bearings to his complete satisfaction. Our importations are normal and we can deliver promptly.

**SKF BALL BEARING CO.**

**50 Church Street**
**New York City**




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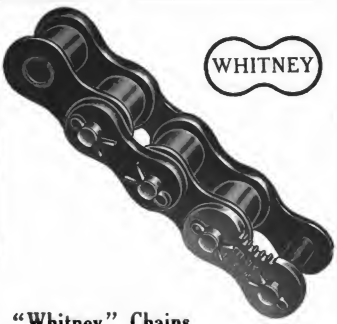
WITH THE
PIERCE GOVERNOR
*Used by fully 70% of all truck manufacturers*
PIERCE SPEED CONTROLLER CO.
Anderson, Indiana



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are made by specialists in the foremost organization for chain design and manufacture in America. Our aim is dependability of service under hardest conditions, and our success in this is shown by the standardization of "Whitney" Chains by the leading motor truck makers of the country.
The Whitney Mfg. Co., Hartford, Conn.
Chains—Keys—Hand Milling Machines

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The production of drop forgings that are guaranteed to give satisfaction is more a matter of skilled forge smiths working under experienced superintendence than anything else.

WYMAN & GORDON facilities and personnel insure a superior product.

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Cleveland
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Combined Side and Rear Delivery
With Gravity Pitch Built In

Introducing our newest patent coal body with combined side and rear delivery. As pictured, body has gravity pitch built in. Elevates by hand 2½ feet. Load can be delivered in 4 minutes. Truck shown is 3½-ton Hurlburt. This is the most efficient and practical device we have ever built—the last word in coal body construction.

We build bodies up to 10-ton capacity, to your specifications and to meet your special needs. Side, rear, or combined side and rear delivery—hand or power hoist. Can be shipped anywhere.

Write for photo and particulars regarding this new body.

New Ideal Wagon Works, 1843-45-47 Park Ave., near 120th St., New York

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ONE FIRM ONE SERVICE

ONE GUARANTEE

BACK OF

EVERY BEARING REGROUND

BY

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Prices f. o. b. Toledo

## Certain and Satisfactory Delivery Service

The Overland Delivery Car has a powerful, dependable 35 horsepower motor. It is electrically lighted and started. It has high tension magneto ignition, revolving oil indicator, electric control switches on the steering column, large tires, and many other big advantages.

*Catalogue on request. Please address Dept. 101.*

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Also Manufacturers of Overland and Willys-Knight pleasure cars.

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BECAUSE—1. They are the strongest made; 2. They are absolutely indestructible; 3. One Comet or Sootless will outlast four of any cheap porcelain or mica washer plug made; 4. They are absolutely compression-tight. *Safe, Sure and Reliable. For sale by all dealers.*

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$1.25

## U. S. MOTOR TRUCKS

—have won the confidence of their owners throughout the world by 5 years of matchless performance, service and durability.

The Agency Is a Valuable Asset

RELIABLE DEALERS WANTED

Capacity
2 Ton
2½ Ton
3 Ton
4 Ton

If you are considering taking on an agency, or should be dissatisfied with present arrangements, WRITE US. Our proposition is a money-maker. Address Contract Dept. D.

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CHAIN AND CHAINLESS **TRUCKS**

### Dealers Receive Real Cooperation

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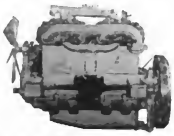

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BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

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**Milwaukee Wisconsin**

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*The True Efficiency in the "Lavine" Steering Gear*

**A Gear With a Worm and Split Nut**

Not the usual worm and pinion device.

Split nut combination with trunnion gives double strength.

Each and every working part heat-treated, pack hardened, pot cooled.

Treatment effected by men expert in the science of metals and annealing.

*It is Lavine thoroughness which gives security*

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# MODERN 1915

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With your co-operation, we are able to supply you with just the truck that will give the most satisfactory and profitable results in your business—Chain or Worm drive models.

**Model "H" 1½ Ton Chain Drive. Model "L" 1 Ton Worm Drive**
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is attained in this worm-drive truck by powerful construction according to a correct four-wheel-drive principle which distributes and equalizes the driving stresses.

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in both regular type and four-wheel-drive are built to take hard usage and show permanent economy.

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**Trucking by Electric power is not only the cleanest and easiest method but the least expensive. Facts and Figures will be quoted that corroborate this statement or better advise us you want a demonstration.**

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If you are not one of the 69 Eisemann users you are not getting the greatest possible ignition efficiency.

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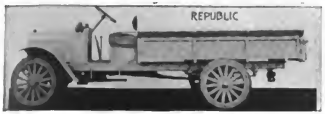


¾-Ton Model

## Republic Motor Trucks

***The Fastest Selling Line of Motor Trucks in America***

¾ Ton with Express Body, Internal Gear Drive .....$ 995.00
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1 and 1½-TON MODELS (CHAIN DRIVE)

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***No Better Units Built***

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Incorporated
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# SERVICE

—without break-downs, locked gears, or balky levers—establish as the most desirable equipment for actual and continued use

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Individual Clutch System. All gears always in mesh.

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**Internal Gear Drive Axles**

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**RUSSEL MOTOR AXLE COMPANY**
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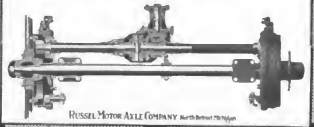





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## DETROIT SPRINGS

for trucks as well as pleasure cars are now made with self-lubricating cups. Near the end of each leaf is a depression which is filled with a long-lived lubricant that is automatically spread between the leaves by the action of the spring.

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Washington, 505 Riggs Bldg. — London, England, 49 Pall Mall


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E. M. Corey, Treas.

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[Seal] (My commission expires March 31st, 1917)



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## Double Duty Trucks

—once put in service—always remain in service.

Whatever your business may be there is a SOUTH BEND DOUBLE DUTY TRUCK that will give you the utmost efficiency and satisfaction.

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**SOUTH BEND, IND.**



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| 1500 POUNDS | 4000 POUNDS | 7000 POUNDS |
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WORM DRIVE — WATER COOLED MOTOR
EXTRA HEAVY FRAME — UNIT TRANSMISSION

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"CHASE YOUR DELIVERY"



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CONSTANT·DEPENDABLE·SERVICE

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MODEL MOTORS

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## Of the Highest Quality

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Made in various models for different sizes and types of cars—Covert Transmissions will free you from transmission troubles. Let us show you how they fit your construction.

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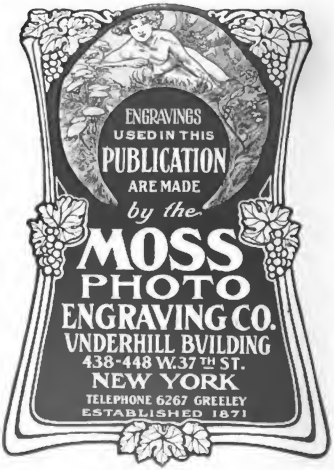
SALES OFFICE Detroit, Mich.

FACTORY Lockport, N. Y.







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Model "T U" ¾-1 Ton

Model "T U 2" 1½-2 Ton

*Particulars sent on request*

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**Kalamazoo, Mich.**

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If you want a strong efficient unit drive that is specially designed for truck work, from one to three tons capacity, write us for complete information about the

## Celfor
## Internal Gear Drive Rear Axle

It possesses marked constructional advantages which commend it to thoughtful designers, engineers and truck makers. We shall be glad to go into these in detail on request.

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is combined with Toughness in Firestone Truck Tires. S.A.E. Removable Rim Equipment enables any driver to change tires—saves time—no layoffs.

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**INTERNATIONAL MOTOR COMPANY**
64th Street and West End Ave., New York City




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Illinois Automatic Windshield Hinge. Ready to attach on any truck, limousine or coupe.

## ILLINOIS AUTOMATIC WINDSHIELD HINGE

**Prevents Motor Truck Accidents**

Protect yourself against damage suits and your trucks against accident, by installing ILLINOIS Automatic Windshield Hinge on all your trucks. Stops accidents due to fogged or dirty shields, and to blinding storms of winter. ILLINOIS Hinge fits any truck. Makes shield always clear vision.

**Guaranteed for Life of Car**

ILLINOIS Automatic Windshield Hinge swings to, and holds, 8 different positions at will of operator. Automatic, positive, fool-proof. Fastens on side of shield. Prevents spreading of frame. Easy to operate.

**Write for free illustrated booklet and moderate prices.**

**Manufacturers:** The most economical safety windshield equipment. The most popular and efficient. Write.

**ILLINOIS BRASS MFG. CO.**
**11-17 S. DESPLAINES ST., CHICAGO**

Diagram shows eight positions Illinois Hinge will take and automatically hold.

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Always-ready strength is the key note of commercial vehicle transmission requirements.

To meet this demand COTTA "SHORT SERIES" TRANSMISSIONS are built for most gruelling service throughout.

Model 10-C

COTTA "SHORT SERIES" TRANSMISSION is the "strongest transmission built." Its 3 speeds forward and 1 reverse are operated by heavy "dog clutches." Large area of working face assures lasting qualities.

*Insist on COTTA "SHORT SERIES" on your next truck*

**Cotta Gear Co.,** 720-730 Sixth Street ROCKFORD, ILL.

MADE ON

USA

1½ TON TRUCKS
2 TON TRUCKS

3½ TON TRUCKS
5 TON TRUCKS

"UNITE WITH THE UNITED"

Continental Motor
Eisemann Magneto
Stromberg Carburetor
Mayo Radiator

Brown-Lipe Transmission
Sheldon Worm Axle
Perfection Springs
Gemmer Steering Gear

Write for Literature—Get Our Prices

**United Motor Truck Company**
Grand Rapids, Mich.

A Real Long Stroke Truck Motor

**Wisconsin**

CONSISTENT

Type TU — 4 in. bore, 6 in. stroke
Type UU — 4¼ in. bore, 6 in. stroke
Cylinders interchangeable.

Note these features.

CYLINDERS—Cast en bloc
CRANKSHAFT—Four bearing chrome nickel steel, 2 in. diameter
VALVES—Rich Tungsten steel
CONNECTING ROD BEARINGS—3 in. long, 2 in. diameter
BEARINGS—Bronze, Babbitt metal lined
CAM SHAFT—One piece, cams integral
OILING SYSTEM—Force-feed hollow crankshaft
3 POINT SUSPENSION

Write today for detailed specifications and illustrations

**WISCONSIN MOTOR MFG. CO.,** Big A Dept 22 **MILWAUKEE, WIS., U. S. A.**




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THE BUDA COMPANY
BUDA MOTOR
"The part to buy the car by"
ESTABLISHED 1881

**"The part that sells the truck"**

A wise Truck manufacturer knows that the best MOTOR is none too good for what the motor truck has to go "up against." (If the motor weren't the essential part he wouldn't call it a "MOTOR Truck," would he?) If the best motor for *your* use is not the "R U" it is surely some of the other Buda Models.

THE BUDA COMPANY
Factory, Harvey, Ill. (Chicago Suburb)
Address FACTORY REPRESENTATIVES: BRANDENBURG & CO.
1112 S. Michigan Avenue, Chicago
57th & Broadway, New York, N. Y. 1311 Dime Bank Bldg., Detroit

One of six Jeffery Quads in the service of the United States Army Signal Corps. This is the most powerful portable wireless station in the world. The Jeffery Quad drives, brakes and steers on all four wheels.

The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin

Brown-Lipe transmissions and differentials represent the maximum from a standpoint of efficiency and durability.

BROWN-LIPE GEAR Co
TRANSMISSIONS
SYRACUSE, N. Y. U. S. A.
NEW YORK CHICAGO DETROIT
Chas. Phelps Cushing R. Peaslee Patterson L. D. Dalton
BROWN-LIPE-CHAPIN Co

CONTINENTAL MOTORS
Powerful as the Nation
AMERICA'S STANDARD

Continental Motors

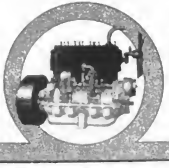
Commercial Four-Cylinder Models

| | | | |
|---|---|---|---|
| Model U | 2¾ x 4 | Model C | 4⅛ x 5¼ |
| Model N | 3⅛ x 5 | Model E | 4½ x 5¼ |
| Model N | 3¼ x 5 | Model T | 5 x 5¼ |
| Model C | 3¾ x 5¼ | Model T | 5⅛ x 5¼ |

Continental Motor Manufacturing Co.
DETROIT, MICHIGAN

Largest Exclusive Motor Builders in the World

Factory Representative: K. F. Peterson, 122 So. Michigan Ave. Chicago





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# NEW DEPARTURE BALL BEARINGS

**American Made for American Trade**

THE most enlightening book ever written on this subject. It covers thoroughly the use of Ball Bearings in Automobile Trucks, Motors, Tractors, etc., and shows conclusively the economic advantages to be derived from the elimination of friction through the substitution of Ball Bearings for those of other types.

This book now on the press will be mailed free to builders, purchasing agents, and bonafide users of the apparatus mentioned if asked for on your letter head.

**THE NEW DEPARTURE MANUFACTURING CO.**

**Bristol, Conn, U. S. A.**

**Conrad Patent Licensee**

**Distributors in Trade Centers Throughout the United States**
**Sole British Agents: Brown Bros., Ltd. London and Manchester**

**For Continent of Europe:**
**Jacob Holst, Copenhagen, Freeport, Denmark**

**WESTERN BRANCH: 1016-17 FORD BLDG., DETROIT, MICH.**

# Ross Steering and Differential Gears

**Will Help Sell Your Trucks**

They are
**STANDARD**
on good motor truck construction

**Investigate**

our new complete line of fore and aft steering gears.

**Enormous bearing surfaces**
**Perfect lubrication**
**Best material throughout**
**Finest workmanship**

**Built in the largest and newest steering gear factory in the United States.**

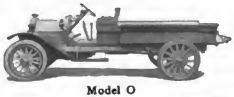
***Write for catalog***

**ROSS GEAR & TOOL COMPANY**

**790 Heath Street** **Lafayette, Ind.**

# Quality and Character

It is essential to have the same high standard of quality and character in the commodities you build as it is to have it in the men who build and sell those commodities. Sanford Trucks are built for quality and character by men who know how.



**Model O**

**Model O**
**¾ Ton**
**$1350**
**Express**

**$1290**
**Chassis**

**Model M**
**4000 lbs.**
**$2000**
**Express**

**$1910**
**Chassis**

Model M

Dealers are requested to send for Sales Plan and inquire for open territory.

**Sanford Motor Truck Company**

**Syracuse** **New York**

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# Truck Tires Free

## Unless the Goodyear S-V Outwears Any Other

We now extend this Guarantee to October 1st. Many truck owners were not in shape to accept it during April, May and June. And we want every user to have this chance to prove the S-V best.

**Equip opposite wheels—at the same time—one with a Goodyear S-V, one with any other standard Truck Tire of like rated size, bought in the open market. If the Goodyear S-V fails to cost less per mile than the other, we will return you its full purchase price, making the S-V free.**

Get this guarantee in writing when the tires go on. Equip all the wheels you wish. Compare the Goodyear S-V with every seeming rival in this convincing way. Then you will end all your costly experimenting. Then you will know the truth.

We guarantee the Goodyear S-V, against any tire that's built.

We dare do this because we have already made 5,000 tests and comparisons. Barring accidents, the Goodyear S-V will surely win against any rival Truck Tire. There are reasons for it. One is more available tread rubber. Another is no creeping, no bulging or breaking, no possible separation. The tread, the backing and the rim are one. Our local branch will tell you where to get the S-V tires under this signed warrant.

GOODYEAR
AKRON, OHIO
S-V Truck Tires

**The Goodyear Tire & Rubber Co.,** Desk 86 **Akron, Ohio**
Makers of Goodyear Fortified Automobile Tires
We make Demountable, Block, Cushion, Pneumatic and Other Types of Truck Tires

# Watch Your Brakes

When a truck won't run, you lose time. When it won't stop, you are apt to lose the truck. Which is more important?

Keep the truck running by all means—that's what it's for. But don't forget the brake linings.

A lot of brake linings are not reliable. When the outside coating wears off they become worthless—friction-shy.

**Thermoid**
**HYDRAULIC COMPRESSED**
**Brake Lining-100%**

Brake lining, to be 100 per cent, must be brake lining all through. Not merely on the outside. It must be trustworthy to the last.

Thermoid retains its 100% gripping power even until worn paper-thin. Hydraulic compression makes it one solid, single substance of uniform density clear through—instead of being loose and stringy (and friction-shy) on the inside, as is ordinary woven brake lining. Guard YOUR truck with Thermoid.

Cannot be burned out nor affected by oil, heat, water gasoline, dirt.

**Thermoid Rubber Company**
**TRENTON, N. J.**
Our Guarantee: Thermoid will make good—or We will.

# What does it cost you per pound per mile?

Does your truck transportation cost more than it should? Are you wasting money that can be saved by greater efficiency? Are you using too much gasoline and oil—or electric current? You can save money by keeping mileage records with the

# TRANSIMETER

(Hub Odometer)

This sturdy and reliable instrument registers every turn of the wheel—both forward and backward. It can't be tampered with. It is absolutely reliable.

## Guaranteed Indestructible

The heavy cast housing on the "Dreadnought" type prevents injury to mechanism from collision.

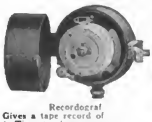
## Easy to Read

Figures do not revolve—always upright and easily read. Grease- and dust-proof—glass window keeps clean on the inside.

***Highest award at Panama-Pacific Exposition***

**Send for Booklet**

**AMERICAN TAXIMETER COMPANY**
Mfrs. of the Recordograf and Jones and Popp Taximeters
131 West 39th Street New York City
Service stations in the following cities
*San Francisco, New Orleans, Washington, Chicago, Detroit Philadelphia, Seattle, St. Louis, Boston.*



Recordograf
Gives a tape record of
1. Time truck is moving.
2. Time truck is standing.
3. Distance truck covers.
4. Speed at various times.

"Dreadnought" Type
Price $20



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# An Agency Opportunity for You

If you are an alert, aggressive dealer and if you want to increase the profit-producing power of your territory, you can do it with

The ACME Two-Ton.
The price is interesting.
The ACME ¾-Ton Announcement will be made later.

## THE ACME MOTOR TRUCK

This sturdy two-ton truck is of practical design, substantially constructed and composed of the **highest grade standardized units.** Back of this truck is a strong financial organization—with permanency assured—a well defined policy in the interest of dealers and profitable dealer co-operation which will make this agency attractive.

**THE ACME SPECIFICATIONS**

Continental motor with automatic speed governor
Warner & Brown-Lipe transmission.
Timken front axle.
Timken worm-drive rear axle
Timken bearings throughout
Heat treated pressed steel frame
Detroit self-lubricating springs
Gemmer steering gear
Kiesmann waterproof magneto
Rayfield carburetor

These standard units demonstrate the class of the Acme truck

**CADILLAC AUTO TRUCK COMPANY, 10 MITCHELL STREET CADILLAC, MICHIGAN**

**INVESTIGATE NOW**

Merely sign and mail the coupon and we will afford you as a reputable dealer every opportunity for careful investigation of this agency opportunity.

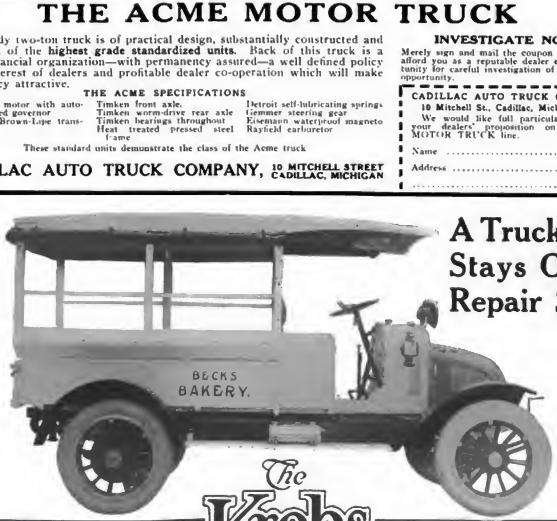
CADILLAC AUTO TRUCK CO.
10 Mitchell St., Cadillac, Mich.

We would like full particulars relative to your dealers' proposition on the ACME MOTOR TRUCK line.

Name .....

Address .....

.....




# A Truck That Stays Out of Repair Shops

## The Krebs

The KREBS Automatically Governed Truck at all times is a source of satisfaction to its owner because of the wonderful record it establishes for efficiency, low maintenance cost and operation simplicity.

Equipped with a Continental Motor, silent worm drive, full floating rear axle, center control, left hand drive and automatic governor, the KREBS Truck is one that prospective buyers cannot afford to overlook.

We make ¾, 1, 2 and 3-ton trucks and quote the lowest figures on special bodies.

*Write for our dealer proposition and be one of the easy money makers.*

**Krebs Commercial Car Co., Clyde, Ohio**

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# The B.A.Gramm Truck

B. A. Gramm engineering practice has kept pace with modern development. Our final drive is the overhead worm type of rear axle—an axle which has repeatedly demonstrated its ability to deliver 95% of the power applied to tractive effort.

There isn't a weak point in B. A. Gramm construction! Each unit is the best of the most advanced type! No other truck can exceed it in the sum of essentials that count for service or in the features that insure economy!

Write for our literature—it is very interesting.

**THE GRAMM-BERNSTEIN CO.**

DEPT. B1 LIMA, OHIO

**BIGGEST MOTOR TRUCK VALUE ON THE MARKET**

Courtesy of Denby Motor Sales Co., New York

# Chosen to carry New York's mail

# GOODRICH WIRELESS TRUCK TIRES

Thirty Denby Trucks, all equipped with Goodrich Wireless Tires, are being operated by the Monahan Express Co., New York, for carrying parcel post matter between postal stations.

Every make of tire was considered before Goodrich Wireless were selected. And the Monahan Express Co. has operated trucks for many years—has had long and extensive experience with tires.

Take facts like these under consideration. They outweigh claims. Don't experiment! Specify Goodrich for *your* trucks.

We know you'd enjoy reading "Upsetting Mileage Tradition." May we forward a copy?

Service Stations and Branches in All Principal Cities

**The B. F. Goodrich Co.**

World's Largest Rubber Factory, Akron, Ohio




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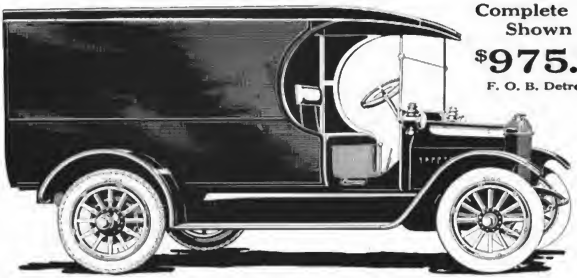
# This is The Commerce 1500 Pound Truck



**Complete as Shown**

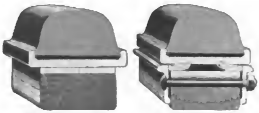
**$975.00**

**F. O. B. Detroit**

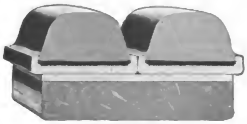
The 1916 Commerce is the result of **six years** successful effort expended in producing a delivery truck perfected by the lessons tought through experience.

**Dealers**—Our agency may be open in your territory. Write today.

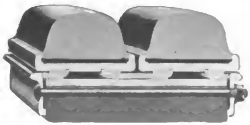
**COMMERCE MOTOR CAR CO., Detroit, Mich.**



Single Pressed-On Single Demountable



Dual Pressed-On



Dual Demountable

# Kelly-Springfield

## TIRES For COMMERCIAL VEHICLES

For maximum mileage at minimum cost, equip your trucks with Kelly-Springfield sectional Block Tires on the rear wheels and Kelly-Springfield Pressed-On or Demountable endless Tires on the front wheels. This is the ideal tire equipment for commercial cars. It will deliver record mileage even under unusually severe service conditions.

**Kelly-Springfield Tire Co.**

**Akron, Ohio**

**Branches in All Principal Cities**

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# A New Car—THE BESSEMER

**Announce an Internal Gear 1-Ton Truck at**

**$975.00**

**Continental Motor—Bosch Magneto**
**Ross Steering Gear**
**Torbensen Internal Gear Rear Axle**

***Deliveries November 1st***

**The complete line of trucks is as follows:**

| Model "G" 1-ton Internal Gear | Model "A" 1½-ton Chain | Model "D" 2-ton Worm | Model "E" 3½-ton Worm |
|---|---|---|---|
| $975.00 | $1800.00 | $2000.00 | $2800.00 |

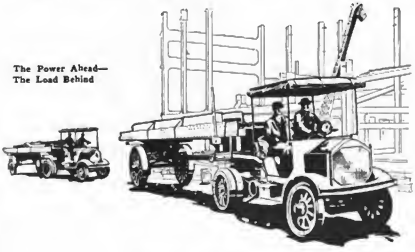
**Write for our Dealers Proposition**

**Bessemer Motor Truck Co., Grove City, Penna.**

# SAVE MONEY

## By Hauling Your Loads With a KNOX Tractor

The Power Ahead—
The Load Behind



**THE Knox TRACTOR**

The Knox Tractor can be the motive power for three trailers, one loading, one unloading and one moving.

The Knox does not carry and push its load like a truck—it hauls it behind. With a double set of springs, no matter what the load, the tractor mechanism does not have to support an additional pound. Flexible springs for the tractor, stiff springs for the trailer.

Any kind of a load in any kind of a wagon.

***Write for our folder, "Heavy Hauling at Light Expense"***

**KNOX MOTORS ASSOCIATES, Springfield, Mass.**

New York 1872 Broadway | Boston 825 Tremont Bldg. | Chicago 1621 Michigan Ave. | Philadelphia 604 Abbott Bldg. | Kansas City 1725 McGee Street

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# HEAT TREATED TRUCK SPRINGS A SPECIALITY

## THE CLEVELAND-CANTON SPRING COMPANY
CANTON, OHIO

# A TRUCK THAT PULLS THE LOAD

The above illustration shows a Duplex Four-Wheel Drive Two-Ton Truck performing an almost unbelievable feat. A flock of sheep which, together with the trailers, weighed over twenty tons, was hauled a distance of six miles over poor country roads. Due to the extremely rugged construction of the truck and its all-four-wheel traction, the run was accomplished without difficulty.

The Duplex is the peer of any truck built for strength and general efficiency. Made in two-ton and three-ton capacity. Fully covered by patents.

***We have an attractive dealers proposition. Get in touch with us immediately.***

## THE DUPLEX-POWER CAR COMPANY
*Manufacturers of* — Four Wheel Drive Trucks
CHARLOTTE, MICH.




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Firestone

Continental Motors

GOODYEAR

TIMKEN

DTA CO.

KELSEY WHEEL

Ford

GEMMER MANUFACTURING COMPANY

RUSSELL MOTOR AXLE COMPANY

GRAY MOTOR CO.

SAXON

HUDSON SIX

—another FEDERAL

THIRTY-EIGHT

Manufacturers of Automobiles, Parts and Accessories—27 more than these famous concerns named here use

FEDERAL

MOTOR TRUCKS

This is a rare tribute to the mechanical correctness of these good trucks. With such universal endorsement by the experts of the automobile industry, you can feel sure, Mr. Business Man, that "Federalized Transportation" would be profitable for you.

Concentrating upon motor trucks only and building them to suit the special requirements of each purchaser, have added to the successful service given by the 4000 to 5000 Federals now in use in all lines of work.

*Write for our Traffic Investigation Reports in your line of industry, and for the "Blue Book of Traffic"*

Federal Motor Truck Co.

DETROIT 122-130 Leavitt St. Address Dept. 5 MICHIGAN

Worm Drive 1½-ton, 2-ton, 3½-ton motor trucks exclusively.



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# Audels Automobile Guide

## With Questions, Answers and Illustrations for

## Owners—Operators—Repairmen

**Relating to**

The Parts, Operation, Care, Management, Road Driving, Carbureters, Wiring, Timing, Ignition, Motor Troubles, Lubrication, Tires, etc., including chapters on the Storage Battery, Electric Vehicles, Motorcycles, Overhauling the Car and an Appendix on Self Starters and Lighting Systems.

**By Gideon Harris and Associates**

**A BOOK WORTH HAVING**

**550 Illustrations, 700 Pages, Flexible black leather binding; to carry in pocket. Price $1.50.**

**"Understand Your Car"—Explained in the following chapters:**

1. Ready Reference Index.
2. The Automobile.
3. The Gas Engine.
4. The Cycle of a Gas Engine.
5. Brief Outline of Gas Engine Principles.
6. Cooling Systems.
7. Fuels.
8. Carbureters.
9. Ignition.
10. Timing and Balancing.
11. Gas Engine Operation.
12. Clutches.
13. Transmissions.
14. The Drive.
15. The Differential.
16. The Running Gear.
17. Tires.
18. Brakes.
19. Ball and Roller Bearings.
20. Lubricants and Lubrication.
21. Motor Cycles.
22. Electrics.
23. Electricity.
24. Dynamos and Motors.
25. Storage Batteries.
26. Methods of Circuit Changing.
27. How to Run an Automobile.
28. Overhauling the Car.
29. Starters and Starting Systems.
30. Electric Lighting and Wiring.

**Book Dept., The Commercial Vehicle, 239 West 39th St., New York**

# Audels Starting and Lighting of Automobiles 50 Cents

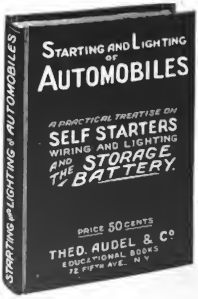
**This New Helpful Book**
tells all about the various forms of starting and lighting systems in use. Written and illustrated in plain language.

**Owners, Chauffeurs and Repairmen**
will find the necessary information for keeping in commission this part of their car, which if not understood may cause trouble.

**The Latest Improvements**
are shown, also directions for ***Installing and operating*** are given, making the book a ready reference for the up-to-date motorist.

**Valuable Diagrams**
are included, showing the wiring and circuit distribution of the various lighting and starting systems, with full explanation of ***how they work;*** the book also gives briefly and clearly the principles of electricity, dynamos and motors, electric gear shifts, etc.

**This New Concise Up-to-Date**
handbook, handsomely bound and finely printed, will be sent to any address postpaid for ***50 cents.***

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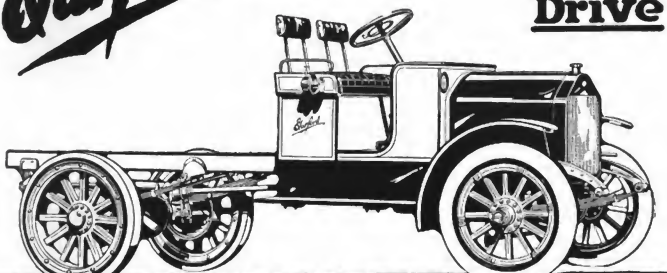
Garford

# 1 Ton Worm Drive



# Quantity Production—Low Price—Big Sales

WE are building this new one-ton Garford in large quantities.

This fact enables us not only to meet the demand that is *there*, but also to make a *price* which has a strong appeal to the substantial business man, looking for a high grade truck at a low cost.

Such a truck—worm driven, strong, substantial and durable in every part—at such a price, opens a vast market heretofore untouched.

Read the specifications below. You will see at once the remarkable salability of such a vehicle.

In combination with the other trucks of the Garford line, and backed by our ten years' prestige, it furnishes what is positively an unexcelled money-making opportunity for dealers.

Our proposition will interest any progressive dealer.

Wire or write us to send you the facts. Please address Dept. 103.

## Specifications Garford 1-Ton Truck

| | |
|---|---|
| **Wheelbase:** | 120 inches. |
| **Motor:** | 4 cylinder bloc motor, L. head, 3¼" x 5½", S. A. E. rating 19.6 H. P. |
| **Ignition:** | High tension magneto. |
| **Carburetor:** | Automatic float feed. |
| **Lubrication:** | Combined force feed and splash oiling system. |
| **Cooling:** | Thermo-syphon, natural circulation. |
| **Clutch:** | Multiple dry disc. |
| **Transmission:** | Selective sliding gear; three speeds forward and reverse. |
| **Rear Axle:** | Latest type worm drive. |
| **Control:** | Center—right hand drive. |
| **Tires:** | Front 34" x 4½" pneumatic; rear 36" x 4" single solid, pressed on or demountable. |
| **Equipment:** | Odometer, curved steel dash, two oil lamps set flush in dash, one rear oil lamp, driver's seat with cushions and separate folding back, jack, tools, horn, oil can, tire pump, tire repair kit and 1 extra demountable rim. |

**$1450**

*f. o. b. Lima*

## The Garford Motor Truck Company, Lima, O.

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# A "Repeat" Order
## For International Motor Trucks

The illustration above shows twelve Model "E" 1,500-pound and two Model "F" 2,000-pound capacity International Motor Trucks. This is a repeat order placed by the Cincinnati & Suburban Bell Telephone Company after using a fleet of twelve Model "MA" 1,000-pound International Motor Trucks for three years.

Many such examples may be cited to show the tenacity with which the International Motor Truck clings to its job. We have figures in abundance to show prospective motor truck owners the exact relative efficiency of horse and International truck. They do not exactly flatter the horse. Progressive firms are buying International Motor Trucks on the strength of the abundant testimony every day, and duplicating the figures in their own business.

There was only one reason for such a repeat order as this one in Cincinnati. International Motor Trucks give service—of the 365-day-a-year kind—the kind of service that is in ever increasing demand.

We can be of service to you in showing how International Motor Trucks can be applied to your business. May we?

**International Harvester Company of America**
**(Incorporated)**
**88 Harvester Building** **Chicago U S A**




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# Type S Indiana ¾ to 1-Ton Chassis $1200

# INDIANA

This new member of the famous INDIANA Family is equipped with a high power motor and worm drive to give it the speed and quietness required for the rapid and economical handling of deliveries and light hauling.

Balancing the power of its motor, the ¾ to 1-ton INDIANA Chassis possesses sufficient strength and flexibility to provide a generous margin of safety against overloads and to insure long life and efficient service even under adverse conditions.

Shall we send particulars about the easy payment plan upon which we are prepared to market this truck?

**WE MAKE TRUCKS IN 3-4 TO 4-TON SIZES**

## Harwood-Barley Mfg. Company

**234 Indiana Ave., Marion, Indiana**



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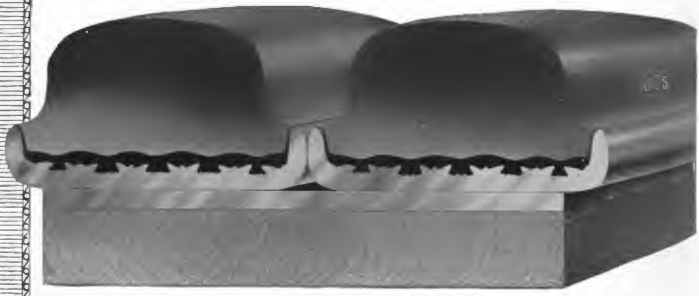
# *Announcing* THE NEW UNITED STATES TRUCK TIRE

**Vulcanized under 800 tons of pressure by a new type hydraulic press—the only press of its kind in the United States.**



After exhaustive tests on hundreds of trucks—on all kinds of roads—under all possible conditions—we announce the new **United States Pressed-on Truck Tire.** The greatest combination of improvements—the most fully developed motor truck tire ever offered.

## Extra Pressure Process

A new type hydraulic press—the only one of its kind in the United States—vulcanizes this tire. The pressure used—800 tons—is about four times the pressure of ordinary truck tire presses. This tremendous pressure forces all gas, and every atom of moisture out of the rubber. It also insures an inseparable union between the rubber and the steel base.

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The new 800 ton extra-pressure vulcanizing process alone means an enormous increase in service, *but* in addition, the new tire has the following improvements:

| | |
|---|---|
| **1. A New Rubber Compound** | A new rubber compound of exceptional toughness which gives a tremendous amount of extra wear. |
| **2. Remarkable Resiliency** | Remarkable resiliency—this new compound affords proper protection to the truck mechanism, a vital feature in maintenance costs. |
| **3. A Larger Volume of Rubber** | Large volume of rubber. The new tire in every size contains a larger volume of rubber than ordinary truck tires. |
| **4. A Substantial Channel Base** | A substantial channel base that protects the union of the tread rubber with the hard rubber and takes all the shock of contact with curbstones and obstructions. |
| **5. Extra Deep Serrations in Base** | Extreme depth of the dove-tailed serrations in the steel base. This anchors the hard rubber so that separation is impossible, even under the most severe strain. |
| **6. An Improved Design** | A new design that controls the displacement of rubber under the load in such a way that the original shape of the tire is maintained until it is entirely worn out. This absolutely prevents any side stripping of the tread rubber. |

**The New United States Pressed-on Truck Tire** means lower tire expenses and reduced maintenance costs. This tire is the result of the concentration of the unequalled engineering and manufacturing facilities of the largest rubber company in the world.

## United States Tire Company

**Broadway at 58th Street - - New York City**

**Branches in all principal cities give prompt, liberal and courteous service**



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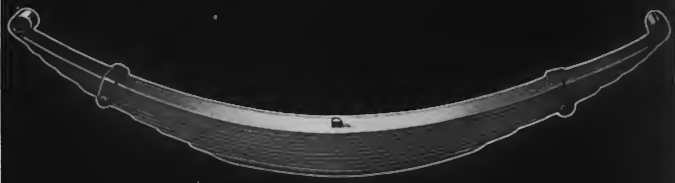
# "The Spring Is the Thing"



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ONE very important ball bearing characteristic is the fact that the coefficient of friction (which is extremely low always) is practically constant, irrespective of load or speed.

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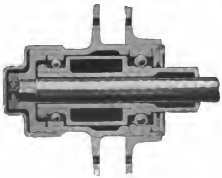
**The Hess-Bright Mfg. Co.**

**Philadelphia, Pa.**



HESS-BRIGHT BALL BEARINGS ARE PATENTED

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# WHITE TRUCKS

## *Awarded the* GRAND PRIZE

## BY THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION AT SAN FRANCISCO

### THE ONLY GRAND PRIZE—THE HIGHEST AWARD FOR MOTOR TRUCKS

Was conferred upon White Trucks by the Superior Jury of Award, as officially announced by the Secretary of the Jury under date of August Second.

This is the ONLY GRAND PRIZE received by any motor truck at the Panama-Pacific International Exposition.

This decision of the Superior Jury of Award reflects the opinion of the largest users of motor trucks throughout the world—and is in accordance with the actual service results of motor truck experience. The points of merit upon which the Grand Prize is awarded are identical with those that have determined the selection of White Trucks by America's foremost firms in every line of business.

White supremacy in the motor truck industry is thus recognized by the highest award that can be bestowed by the greatest exposition the world has ever known—just as this supremacy has been recognized by motor truck users for many years.

### REGARDING OTHER CLAIMS

The decision of the Superior Jury is final in the matter of Exposition awards. Hence any announcements of other motor truck manufacturers, claiming to have received the Grand Prize and Highest Award for motor trucks at the Panama-Pacific International Exposition, are automatically denied by this decision of the Superior Jury of Award.

THE WHITE COMPANY
CLEVELAND

*Largest Manufacturers of Commercial Motor Vehicles in America*




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The COMMERCIAL VEHICLE

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The Field of the Motor Truck Trailer

Is covered in the most comprehensive manner in this issue of

The COMMERCIAL VEHICLE

The history of the trailer principle is chronicled from the first two-poled trailer of the savage, through the wheeled trailer used behind animals to the present types used with motor tractors and trucks.

Slight changes made in the conventional motor truck for use as a tractor are stated and the reasons given therefor.

Work in which trailers have proved most economical are also cited and from these the motor truck owner should be able to decide whether the use of trailers in his own business would be beneficial.

Nor is this all, for in the next issue of

The COMMERCIAL VEHICLE

All the motor truck and tractor trailers now offered on the American market will be pictured and described in full.

This will be of great value to the present users of motors who are considering the introduction of trailers in their haulage equipment.

Be sure to read the November 15 issue of

The COMMERCIAL VEHICLE

READ BY BUSINESS MEN

239 West Thirty-ninth Street
New York City



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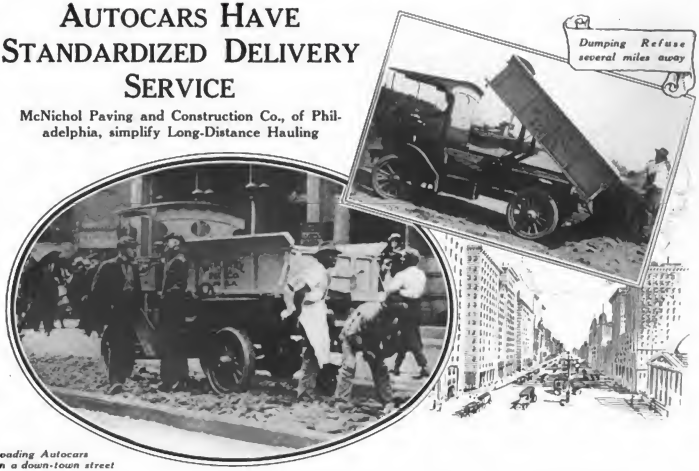
# AUTOCARS HAVE STANDARDIZED DELIVERY SERVICE

**McNichol Paving and Construction Co., of Philadelphia, simplify Long-Distance Hauling**




*Loading Autocars on a down-town street*

In the recent work of repaving Chestnut street, Philadelphia, the Autocars of the McNichol Paving and Construction Co. attracted much attention. Four cars were in use—the first two doing what it formerly took nine teams to accomplish.

These Autocars hauled both men and material—sand, cement, earth, broken asphalt, wood blocks and Belgian blocks, carrying loads over the torn-up paving, car tracks, and rough roadbed, as well as over soft dirt.

They made 12 trips each in every 10-hour day and worked double shift—both day and night. Each traveled up to 91 miles in 10 hours, and could do more but for the inability of the men to load any faster with their shovels.

Mr. McNichol was astonished by the work of the Autocars—especially as, he says, he did not consider it was possible for any truck to do what the Autocars accomplished. He has just placed an order for two more Autocars.

Autocars are used in every line of business by over 2600 concerns. Ask for a demonstration in your own business.

*Write for illustrated catalog and list of over 2600 concerns using Autocars in every line of business*

**Chassis Price, $1650**

# THE AUTOCAR COMPANY

**Ardmore, Pennsylvania**

Established 1897 MOTOR CAR DELIVERY SPECIALISTS



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The COMMERCIAL VEHICLE
Read by Business Men

Vol. XIII November 1, 1915 No. 7

# Trailer Economy Makes Trucks More Efficient

## Part I

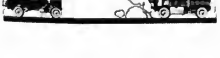
### Trailers Effect Savings Where Loads Are Heavy, Bulky, or Where Loading Is Poor

By Joseph Husson

Fifty tons of trailer and load! A 40-ton steel vestibule for the National Park Bank, New York City, being hauled from the pier to the bank location by two trucks, a 5-ton La France hydraulic loaded with 6 tons of paper, and a 3-ton Sampson, also loaded to capacity for traction. Horses to haul this monster load would have required such a span as to block all traffic on the route traversed. The trailer was the heaviest horse wagon obtainable

**Road Resistances in Pounds per Pound**

| Type of Surface | Road Condition Good | Bad |
|---|---|---|
| Brick or concrete | .010 | .030 |
| Wood block ..... | .015 | .040 |
| Asphalt ..... | .017 | .050 |
| Belgian block ... | .018 | .030 |
| Dirt, hard ..... | .020 | .045 |
| Dirt, ordinary ... | .045 | .075 |
| Dirt, poor ..... | .075 | .125 |
| Dirt, muddy ..... | .050 | .200 |
| Dirt, sandy ..... | .075 | .150 |
| Sand, with dirt... | .100 | .250 |
| Sand, beach, clean | .200 (wet) | .600 (dry) |



ECONOMY is the basic reason for the use of trailers with motor trucks or tractors. Economy is secured because the truck or tractor is inherently able to pull a greater load than it can carry. Moving a greater amount of goods in a given time means less cost per unit transported—this is economy. That a vehicle is able to pull more than it can carry is due to the use of its latent power known as drawbar pull to haul trailers.

The trailer, however, is not a universal vehicle, as there are many classes of work where a truck unit is more suitable than a tractor-trailer or truck-and-trailer combination, as is explained further on in this article.

The principle of trailers is ages old.

**Increase in Truck Capacities with Trailers**

| Capacity of Truck | Drawbar Pull at One-half of Capacity in Pounds | Additional Tons Handled at 250 Pounds Drawbar Pull per Ton | Total Practical Capacity with Trailers in Tons |
|---|---|---|---|
| 1 ton | 1,000 | 4 | 5 |
| 1½ " | 1,500 | 6 | 7½ |
| 2 " | 2,000 | 8 | 10 |
| 2½ " | 2,500 | 10 | 12½ |
| 3 " | 3,000 | 12 | 15 |
| 4 " | 4,000 | 16 | 20 |
| 5 " | 5,000 | 20 | 25 |

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A Rulkley-Ryder tractor on one of its two daily trips between Los Angeles and San Pedro harbor. Loads as high as 35 tons are hauled. The first three of the five trailers in the train are Troy 5-tonners

One of the new Knox four-wheelers owned by the Peters & Baird Co., Wadsworth, O., hauling four wagon trailers carrying crushed stone for road construction work in addition to load on Watson semi-trailer

It dates back to the time when the animal was found to be more efficient when he pulled a load than when he carried it on his back. The trailer development started centuries ago when the savage tied two sticks on the back of his horse with the other ends on the ground and carried his load in the middle.

The invention of the wheel enabled the animal to pull considerably more than he was able to carry. For thousands of years practically all land transportation was carried on by animal tractors and wheeled trailers. The advent of the steam locomotive and the tug boat merely changed the tractor from animal power to mechanical power. The principle behind each is identical.

When the motor-propelled passenger vehicle became a possibility through the invention and development of light power plants and the differential gear it was but a step to the motor-propelled commercial vehicle, which has since been developed into a type all its own and having very little in detail in common with the passenger vehicle.

During the development of the motor truck from its inception to the present-day type, it has often been found less economical to operate than horses, especially where loading and unloading conditions were poor.

Above, at the left, a White road tractor with wide steel tires carrying its own load and hauling two steel-tired wagon trailers in road construction work in La Porte, Ind. At the top, to the right, a 2-ton four-wheel-driven Jeffery owned by George Wade, Kenosha, Wis., which by the use of four trailers operated two at a time, proved 42 per cent cheaper than horses, as described in THE COMMERCIAL VEHICLE of December 1, 1914. Directly above, a 2-ton Duplex operated in Charlotte, Wis., which recently hauled a flock of 300 sheep from a farm 6 miles outside in the city, using six trailers. The sheep weighed 15 tons and the trailers 4½ tons, making a total load of 19½ tons

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To the left, a special 12-ton reversible Detroit trailer used in connection with a special Peerless 6-ton truck with crane for the haulage of Detroit's garbage from sub-stations for shipment to reduction plants outside the city by rail

To the right, a 6-ton G. V. Mercedes gas-electric carrying a capacity load and hauling in addition a G. V. trailer with an equal load of uncut stone. Note the novel method of connection of the trailer to the truck

In such cases, where modern loading and unloading methods have been provided, the motor truck has proven far more economical than horses because of its great ground-covering ability and staying powers. In some cases these modern loading and unloading methods cannot conveniently be introduced, although this is false economy in the end. It is literally and actually true that thousands upon thousands of dollars are being wasted annually in all parts of the United States merely because motor truck owners will not install up-to-date loading and unloading methods which will permit their vehicles to be actually in motion for the greatest possible time. A motor truck never made money by standing idle, for then it is a mere repository for merchandise and a very expensive one in the bargain.

Obviously under these conditions the next logical step is to make the truck do more work than before and therefore show a greater profit. The only way to do this, other things being equal, is to make the truck carry more goods. The easiest solution of this problem is to metamorphize the truck into a tractor and to draw all or a portion of its load instead of carrying it. This is the purpose of the motor truck tractor and trailer.

### The Field of the Trailer

Today the field of the trailer may be divided into four divisions, three of which are already here and the fourth on the way. These classifications may be designated as follows:

1—The hauling of heavier loads.

2—The use of trailers to increase the truck efficiency when the loading and unloading are very slow, thus making it possible for the truck to realize its full ground-covering ability.

3—The use of trailers where the truck load is of such bulk but of such little unit weight that with the ordinary-sized body the weight of the full load is but a fraction of the truck load capacity.

4—The use of light, pneumatic-tired, two-wheeled trailers coupled to the rear of the conventional truck or passenger

Two examples of heavy loads motor hauled. At the top, a 33-ton boiler carried on a special 8-ton trailer hauled for the Henderson Co., Philadelphia, Pa., by one of the new Knox four-wheelers. It would have required twenty-eight horses to pull this load and an additional ten horses to start it. Directly above, a Kelly 3-ton truck hauling a 20-ton boiler through the streets of Erie, Pa. Note the novel six-wheeled trailer used

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At the left, a monster Shadbolt-built semi-trailer with special steel-shod wheels. A 30-ton trailer built by Jacob Press, Chicago, and used in connection with a Knox three-wheeled tractor for hauling rolls of lead-covered telephone wire is shown at the right

car and carrying a separate load in addition to that carried on the truck, in some cases.

### Trailer Work Haulage, Not Delivery

These four classes of work in which trailers are most efficient may be grouped under one general head, namely, the hauling of comparatively heavy loads of goods, as opposed to the delivering of goods. In the latter case, the speed required and great number of deliveries with a corresponding number of stops to be made at various points, render the separate truck more suitable than a trailer unit. This is also the case when deliveries have to be made in the congested portions of a city where many stops and starts have to be made due to traffic or when deliveries have to be made over poor country roads.

The trailers used in these four classes of work may be divided into three broad classifications as follows:

1—The semi-trailer.

2—The four-wheeled trailer.

3—The two-wheeled trailer.

The semi-trailer is of the two-wheeled type but differs from the conventional two-wheeled unit designated as No. 3 in that a certain percentage of the trailer load is supported on the tractor frame while in the latter case the entire trailer load is separate from the tractor load and supported entirely by the trailer wheels. The four-wheeled trailer is an entirely separate unit, carrying its own load.

The work which these three kinds of trailers do and the manner in which they are used may also be divided into four classifications, as follows:

1—Trailers in trains.

2—Trailers for heavy loads above 10 tons.

3—Trailers for medium loads of from 4 to 10 tons.

4—Trailers for loads less than 4 tons

The motor truck trailers for the above four classes of work are all developed from horse wagon trailers. The great differences between the old wagon trailers and the modern truck ones are a general strengthening of parts, an increase in flexibility and the use of improved wheel bearings, all of which have been found necessary to stand the great increase of truck speed over horse speed.

A special Peerless truck and trailer used by the National Lamp Wks. of the General Electric Co. to transport bulbs for incandescent lamps from its glass factory in Niles, O., to its lamp factories in Youngstown and Warren, O.

Five-ton Troy trailer and 1½-ton Federal truck used by the Saxon Motor Co., Detroit. Before the trailer was used, the truck hauled about 3,150 pounds daily. With the trailer it now hauls 17,421 pounds, about four and one-half times as much. The increase in the cost of gasoline is said to be about 6 per cent with no noticeable increase in other expenses

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To the left, a 10-ton Standard tractor with mighty semi-trailer for coal. At the right, a 3½-ton Garford tractor with bottom-dump semi-trailer converted from threshorse wagon

In some instances, especially in the four-wheeled trailer class, two of the most prominent American trailer manufacturers have departed entirely from the old designs and brought out trailers which closely follow motor truck practice except for the absence of the motor and the driving and steering mechanism. These have motor truck frames, truck axles with roller or ball bearings, and rubber tires all around. They are structurally as strong as the truck of the same capacity and carry the same or a greater load without speed restrictions. Exceptions to this type are those trailers used for road construction work which do not differ materially in most cases from the old horse-wagon type because the speeds are low.

### Semi-trailers Developed from Wagons

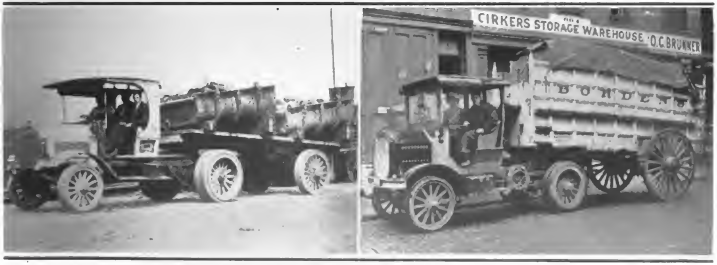
The two-wheeled semi-trailer is essentially a development of the horse wagon with its conventional fifth-wheel mounted on a motor tractor instead of a horse fore-carriage. Steel-shod trailer wheels are still used, these being one of the great advantages of this type when the wheels are so constructed to stand up under speeds of from 12 to 15 miles per hour because steel tires are considerably cheaper than rubber ones.

The light two-wheeled- pneumatic-tired trailer has been used principally behind passenger cars up to the present time and it is only recently that they have been used in connection with motor trucks, although it is evident that there is a great field for either the two- or four-wheeled light trailer because of the great preponderance of light trucks over the heavy ones now in use.

The manufacture of four-wheeled trailers for use in connection with motor trucks in this country began in 1910 and 1911, although many semi-trailers were in use before that time with motor tractors built especially for such work. Since that time both types have developed along progressive lines. This development has been due to the acceptance of the trailer principle which at first hindered the growth of the industry because, while not new in other modes of transportation,

(Continued on page 29)

At the top, a Trailer Transportation Co.'s 10-ton semi-trailer unit in which the trailer wheels track with those of the truck. Directly above, one of the New York City Municipal Asphalt Plant's Watson 6-ton bottom-dump trailers which is hauled to the job by a Saurer tractor and then moved from point to point by the steam roller, thus permitting the tractor to return to the plant for another load




At the left, one of the Mack 7½-ton tractors used in the New York City subway construction with special semi-trailer to carry two large scale-pans of rock. To the right, a Knox four-wheeler used by the Borden's Condensed Milk Co., New York City, with semi-trailer converted from horse wagon

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# Electric Vehicle Convention Encourages Progress Along New Lines

## Future of Electric Vehicle Industry in Hands of Central Stations—Battery Rental Plan Promising

NEW spirit and enthusiasm was engendered in the electric vehicle and allied interests by the Sixth Annual Convention of the Electric Vehicle Assn. of America, which completed its 2-day program with a lively banquet tonight at the Hotel Statler here.

They were 2 very full days for the delegates, morning, afternoon and evening sessions being held yesterday and today.

Attendance ran close to 300, and a good proportion were central station men. There were eighty-seven central station operators on hand, fifty-two battery men, forty vehicle manufacturers or their representatives, sixty-five electric accessory men and forty-five having miscellaneous connection with the industry. From this it will be seen that the current-supplying branch of the business is evidencing great interest in the development of the sale of electrics, while the makers and those supplying them with equipment were also out in fairly strong force.

Registration records showed that the gathering was by no means from any one section of the country, nearly all large cities being included. For instance, an unofficial count showed that there were fourteen from New England, ten from Philadelphia, sixteen from Detroit, two from Los Angeles, fifty-one from New York City, and one or more from many other localities. Naturally, due to convenience, many of Cleveland's electric men came, the total from the city being 115.

### W. H. Johnson New President

The convention elected as officers for the coming year four who are connected with current producing companies, two who are members of electric car manufacturing businesses, and one identified with an electric engineering concern. W. H. Johnson, vice president of the Philadelphia Electric Co., Philadelphia, was made president. The other officers are E. S. Mansfield, superintendent operating bureau of accounts, Edison Electric Illuminating Co., Boston, vice president; H. M. Edwards, auditor, New York Edison Co., New York, treasurer; W. H. Blood, Jr., Stone & Webster Management Assn., director; P. D. Wagoner, president, General Vehicle Co., Long Island City, N. Y., director; G. H. Kelly, secretary-treasurer, Baker R. & L. Co., Cleveland, director, and the retiring president of the association, J. F. Gilchrist, vice president, Commonwealth Edison Co., Chicago, director.

Although no statement was made relative to these selections, which were voted unanimously by the convention, it is probable that the central station people were made vitally interested in the association in this way in order to cement their co-operation with the manufacturers more and more.

### What Was Done

Summing up the work of the convention, one of the most important steps was the voting for closer attention to the relations with the National Electric Light Assn. with the view of working hand in hand with that body, and possibly later affiliating with it. The N. E. L. A. is a strong association whose influence can be of great assistance to the E. V. A.

The sentiment of the gathering was for closer co-operation between the central station interests on the one hand and the vehicle makers and sellers on the other. It was felt that in the central station lies the power to materially boost the business, not only in a general way, but in municipal quarters where fire, police, ambulance and other forms of vehicles are needed.

It was apparent from the trend of the discussions that the electric men realize the lack of satisfactory electric garage service at present, and they see in this phase one of the reasons why electrics have not come into more extensive use. It was brought out that the properly equipped electric garage is necessary to the development of the industry.

Recognition was also made of the fact that it is a fallacy to sell electric trucks for classes of service to which they are not best adapted. It is believed that there is a distinct field for both the gasoline and the electric vehicle, and scientific analysis of the transportation problem in hand is desirable before selling vehicles for any service. This will lead to greater satisfaction in the end and will mean more sales to the same source instead of dissatisfaction where a truck has been improperly placed.

In addition to the committee reports, which in some cases were so exhaustive and valuable in their findings as to be regarded in the same light as papers, the convention listened to seven papers by men well equipped to handle their subjects. There were several of vital importance. These were "The Field For the Small Electric Delivery Vehicle," by C. A. Ward; "The Problems We Are Facing and How They May Be Met," by G. H. Kelly; "The Electric Taxicab," by I. S. Scrimger, "The Function of the Electric Garage," by R. Macrae. The other papers were perhaps of more general interest to the station men as well as the manufacturing element.

### Convention in Detail

Following the welcoming of the delegates to the city of Cleveland by Bascom Little, president of the Cleveland Chamber of Commerce, the convention got under way with the address by President J. F. Gilchrist. He said in part:

"During the year just passed the association has continued its work of aiding co-operation between the various branches of the electric vehicle transportation industry. Standing committees have been at work along th same lines, practically, as those which were studied by committees of former years.

"It may be said that the work of the association this year has been consistent and persistent, rather than spectacular. A great deal of attention has been given to the accumulation of data and information useful to the members, and equal attention has been paid to publicity of value to the industry in the shape of articles prepared for the information of the general public. The membership has shown a very good growth during the year, notwithstanding the period of marking time which has caused many organizations and industries to stand still."

President Gilchrist further said that the association intends publishing its own bulletin instead of continuing its relationship with the publication which has been carrying the official reports of the organization.

Speaking of co-operation he said: "If we are really in earnest in the intention to put the electric vehicle, passenger and commercial, where it belongs, we must forget petty differences and act strongly

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in unison. And that means all of us—manufacturers, agents, dealers, garage keepers, central men—all who are interested in the industry."

### Support Good Roads

The National highways were also favored by Mr. Gilchrist. "While we may not all consider the electric passenger car a touring car at the present time," said he, "nevertheless we should all, I believe, take an intelligent interest in the great national highways. . . . Do not forget that the use of these highways may be found very important for commercial electric vehicles.

"The year has witnessed a considerable development in the various plans for selling electric vehicles without batteries," he continued, "giving battery service on some rental or battery exchange plan. It is perhaps too early to express an opinion as to the ultimate result of this movement. It is most important, and I do not hesitate to say that some plan of this sort must be worked out to a successful conclusion before the electric delivery wagon or truck is to be regarded as an entire success for the use of the small merchant. The large user has a great success with the electric wagon at the present time, but it seems to me that we must certainly extend a helping hand to the small user in the matter of battery maintenance.

### Stronger Faith

"We have emerged from a quiet year with a faith stronger than ever in the efficiency and practicability of the application of electrically-propelled vehicles. I think I may say that those of us who have watched the development of the applications of electricity for such purposes as lighting, motor drive, elevator service and high temperature furnaces, and have in each case witnessed the triumph of the electrical method—sometimes faster and sometimes slower—do not entertain the slightest doubt that electric vehicle transportation will gradually occupy a broader and broader field until it has become a dominant method."

### Membership Increases

In spite of the general adverse business conditions of the past year, and especially the very great depression suffered by the electric vehicle industry, the membership in the association was reported to have grown some 24 per cent, the total registration at this time being 1,094. This is considered very encouraging. The membership committee's report also shows that there are sixteen sections of the organization in all parts of the country.

Reports of the various committees showed that they are indeed very active in promoting the electric car cause. There is a motion picture committee whose duty it is to circulate motion pictures that will promote the business. At this time a film having to do with the selling of electrics has been actively circulated throughout the sections of the organization east of Chicago, and it is hoped to have it used in the west this year. Then a great many special articles have been written for the daily press, and newspapers and other publications aided in every possible way to give accurate electric vehicle news.

The Garage and Rates Committee reported that early in this year a meeting was held in Chicago to which the representatives of all of the commercial vehicle manufacturers having offices in that city were invited. At this meeting the representatives expressed a unanimous opinion that:

1—A battery service system would make it possible to increase their sales 100 per cent in the district where a suitable service was available.

2—If the battery service could be rendered through independent reliable garages it would be preferable.

3—That more sales effort must be spent on prospects. At present in this district there are thirty gas truck salesmen to one electric.

This committee has recommended a new sign which measured 24 inches across and has a blue background with a red cross-bar and letters of white. The wording is "electric charging station."

### Central Station Co-operation

The report of the committee on central station co-operation was received with a great deal of enthusiasm by the convention, dealing as it does with a subject so vital to the interests of both manufacturers and those who supply current. There are certain duties of both, and Chairman W. H. Johnson has very evidently gotten at the root of the whole matter.

# Kelly Calls Service the Problem of Today

## Charging Facilities Must Be Improved and Expert Battery Care Provided

Most vital to the electric vehicle industry of the subjects discussed were those of general application introduced by George H. Kelly. He pointed out that the problem of today is first, how to create a demand for electric vehicles, and second, how to care for the vehicles after they are sold. He emphasized the importance of after-sale service, stating that it is today impossible for electric owners to procure the service for their vehicles that gasoline truck owners get.

### Dearth of Electric Garages

In Cleveland, for example, which is something of an electric city, there are not over a dozen electric garages, as against over 150 gasoline ones. The solution of this must be worked out along lines of central station co-operation, he stated, and perhaps the most extensive use of the battery exchange system. He stated that the informed buyer of today is more interested in maintenance cost than original investment and that the battery came in for the greater part of maintenance.

The discussion of this paper was animated. The hugaboo of the business, said one man, is the proper charging station where the batteries can be correctly taken care of. One concern lost the sale of forty vehicles because it had not the proper garage facilities. This is the hardest thing to overcome in selling electrics.

W. C. Johnson was at a loss to see how the business can be brought to where it should be unless the various factions co-operate earnestly. This co-operation might lead to the forming of a joint committee of central station men and manufacturers to decide among themselves what is best to do. The only limit to the action of the electric is its mileage, but when you can take on energy at any time at the curb, as the Detroit Taxicab and Transfer Co. is doing, the problem seems nearer solution.

E. E. Chalfant thought that the future of the business depended upon constructive and intelligent co-operation. One of the greatest local problems is that the electric dealer cannot properly conduct charging stations and attend to selling, too. The central stations, however, have co-operated during the past year with the dealers more than ever before. He sees the need of a paid man to send to the indifferent central stations and convince them of the advantages of pulling together.

P. D. Wagoner, of the General Vehicle Co., said that no greater mistake can be made than to try to apply the electric truck to the field best filled by the gasoline vehicle. At the end of the war all will face new conditions. The gasoline truck makers, by reason of the great demand, have gotten in shape for large output, have tooled up for it, and therefore the electric makers must pay attention to business and not let the others get the lead when hostilities cease.

Closely related to the above discus-

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sion was that on Willis M. Thayer's paper, entitled "Data on the Hartford Electric Light Co.'s Experience with the Battery Exchange System for Commercial Vehicles." This paper was a review of the system described and illustrated in THE COMMERCIAL VEHICLE of September 1, 1915. Among the most interesting of Mr. Thayer's remarks were the following:

# Data on the Hartford Electric Light Company's Experience With the Battery Exchange System for Commercial Vehicles

By Willis M. Thayer

IN the old days of the Electric Vehicle Co., as far back as 1900, the Hartford Electric Light Co. purchased and used a number of electric vehicles, both commercial and passenger. There has been no time since when this company has been without some electric vehicles of each of these classes.

The original equipment of commercial vehicles were of the Riker construction, some six in number, and each vehicle known by some nickname. One truck as the Yellow Wagon; another as the Black Wagon; two Peanut Wagons; and a 2-ton Riker, known as Maggie. This 2-ton Riker was the most satisfactory of any of the earlier vehicles, and was in continuous use by the company from February, 1901, when purchased for 12½ years, handling freight and stock room work. The company's battery experience is even longer than its vehicle experience, dating back to 1896.

### The Lighting Company as Agents for Electric Vehicles

During the period up to 1910, passenger electric vehicles were represented by a number of agents and many placed in use. As a rule, these same agents represented commercial electric vehicles also, but made no effort to sell them and had no information at their disposal which would assist them in doing so. The Hartford Electric Light Co. decided that the commercial electrics would never be fairly represented in this way. The company decided to take the agency for a commercial electric and considered that the best results would be obtained by confining this agency to one make of vehicle only. The company, therefore, took the agency for General Vehicle Co. trucks early in the year 1910 and purchased three trucks, one of 1,000-pound capacity and two of the 1-ton size, which were received in July, 1910. One 1-ton car was placed in the hands of the vehicle department for demonstrations which were made without charge wherever possible.

The following is a list of the cars at each period of six months with the miles traveled that month and total miles traveled to date:

| | |
|---|---|
| **June, 1910** | |
| Number of trucks in use | 3 |
| Miles for month | 272 |
| Total miles to date | 272 |
| **December, 1910** | |
| Number of trucks in use | 5 |
| Miles for month | 3,196 |
| Total miles to date | 15,573 |
| **June, 1911** | |
| Number of trucks in use | 6 |
| Miles for month | 2,915 |
| Total miles to date | 31,396 |
| **December, 1911** | |
| Number of trucks in use | 14 |
| Miles for month | 3,630 |
| Total miles to date | 32,137 |
| **June, 1912** | |
| Number of trucks in use | 18 |
| Miles for month | 11,757 |
| Total miles to date | 138,925 |
| **December, 1912** | |
| Number of trucks in use | 31 |
| Miles for month | 15,207 |
| Total miles to date | 218,874 |
| **June, 1913** | |
| Number of trucks in use | 32 |
| Miles for month | 24,873 |
| Total miles to date | 347,636 |
| **December, 1913** | |
| Number of trucks in use | 46 |
| Miles for month | 32,751 |
| Total miles to date | 574,900 |
| **June, 1914** | |
| Number of trucks in use | 50 |
| Miles for month | 38,614 |
| Total miles to date | 737,343 |
| **December, 1914** | |
| Number of trucks in use | 58 |
| Miles for month | 40,787 |
| Total miles to date | 978,526 |
| **June, 1915** | |
| Number of trucks in use | 64 |
| Miles for month | 47,615 |
| Total miles to date | 1,232,967 |

### Equipment for Battery Service

The customer purchases trucks without battteries under the Battery Service System, as developed by the Hartford Electric Light Co. The company buys the batteries, charges and installs them in the customers' trucks. The equipment required by the company consists of batteries, the means for charging the batteries, and the apparatus for placing the batteries in the customers' trucks. The odometers on the trucks are also a part of the company equipment, with the cradles for the extra batteries. The service may be divided into two parts; the charging of the batteries in cars at night and the charging of batteries cut of cars. All charging of batteries in cars is done at the garage of the Commercial Electric Co., 1271 Main street, where the company has installed charging equipment consisting of a rotary converter, having a capacity of 850 amperes at 250 volts, and a motor-generator set, having a capacity of 800 amperes at 250 volts. Both of these machines are designed for operating on the three-wire system. This equipment is operated by employes of the company from 11 p. m. to 7 a. m. The arrangement of rheostats, etc., is the same as described later under the exchange station equipment.

All batteries not charged in the cars are handled at the State street station. This station is in the direct current zone, and an ample supply of power available at 110-220 direct current. There are thirty-one sets of charging equipment installed. Each set is made up of one am meter, one Sangamo ampere hour meter, one circuit breaker, and one switch. All batteries used on the service are Edison batteries of the standard size, recommended by the G. V. Co. for the different sizes of trucks, and all the trucks on the service are G. V.'s, equipped with universal cradles.

The universal cradle is an underslung battery container, secured to the car by four hooks, one at each corner, and is removable in one unit by raising the battery about 2 inches, removing the hooks and detaching the battery leads. The vehicles are run into guides over hydraulic lifts for the purpose of removing the batteries. The hydraulic lift is made up of four cylinders, one at each corner of the platform, 3 feet by 6 feet. This platform in the lowered position is even with the floor. Each of these cylinders has an inside diameter of 6 inches and a maximum lift of 10 inches. Each cylinder is connected to the city mains by a 1-inch pipe. The opening of one valve of the city mains places a water pressure of 60 pounds on each of these cylinders, which has proved ample to raise any batteries in use. The same pipe used for supplying the water to the lifts is also used for discharging the water and lowering. This is done by closing the valve on the city main, and opening a valve on the discharge main. The original equipment contained a plunger valve on each of the four pipe lines to the cylinders. These valves have proved of small value. Each cylinder lifts the battery gradually into contact with the frame of the truck and automatically adjusts itself to varying heights of the truck frame from the ground, caused by worn tires or poorly distributed load.

Some form of platform truck is necessary for handling batteries when disconnected from cars. The Cowan truck used for this purpose has a height of 7 inches and is equipped with a platform which may be raised or lowered 1½ inches by the handle of the truck. The Cowan truck is placed on the platform of the hydraulic lift under the car from which the battery is to be removed. The hydraulic lift raises the Cowan truck into contact with the battery cradle and raises the whole equipment high enough to permit the removal of the hooks which secure battery to body of car. When hooks are removed and wires detached, the battery is lowered and removed on the Cowan truck to the charging room. The raised platform of the Cowan truck allows the battery to be run over skids in the charging room. The battery is then lowered on to the skids and the truck removed for other work. The exchange station is equipped with two complete hydraulic outfits for exchanging batteries. A single equipment is capable of making the complete exchange of battery in three minutes or less.

### Charging Methods

No instruments are used on the cars except odometers. All battery charging is based on the mileage covered with allowance for road conditions. When battery is removed from car the odometer reading is taken. The previous reading gives the miles covered and a slip is placed on the battery showing this distance. The man who places the batteries on charge uses this distance as the basis, multiplying same by a certain constant, depending on road condition, size of truck, etc. The Sangamo meter is set at the number of ampere hours required and runs back to zero, where the circuit breaker cuts it out. The voltage on individual cells is followed during the charging and serves as a check on the ampere hour meter.

Some power is saved in this way. The Sangamo meter, however, is practical and accurate, and is certain to take the battery off charge before excessive charging occurs. Batteries are cleaned with live steam at a pressure of 10 or 15 pounds. Distilled water is obtained from Barnstead water stills, operated electrically.

The record of cars and batteries for June, 1915, stands:

| No. of cars | Size | Batteries | Ratio |
|---|---|---|---|
| 11 | 750-lb. | 17 | 1.54 |
| 22 | 1,000-lb. | 34 | 1.54 |
| 28 | 1-ton | 33 | 1.18 |
| 3 | 2-ton | 5 | 1.67 |
| Total, 64 | | 89 | 1.4 |

During the month of December, 1914, cars on the road represented 1,432 car days, 1,284 exchanges of batteries were made, or 90 per cent of the cars changed batteries every day. The number of cars stalled for any cause whatever was one for every 30 car days, that is, one car would get into difficulty every 1,450 miles.

During the month of June, 1915, cars on the road represented 1,594 car days, 988 exchanges of batteries were made, or about 64 per cent of the cars changed batteries every day. The num-

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ber of cars stalled for any cause whatever was one car for every 477 car days, or the average car would get into difficulties once in every 14,310 miles. Twenty-four per cent of the cars do not charge at night. The record of stalled cars includes every cause whatever, and does not necessarily imply exhausted batteries. An inexperienced driver might run his truck over into a back lot or over a bank.

The power used is measured by watt meters and includes all losses in transformation and stepping down.

For December, 1914:

Total power consumed was 57,856 kilowatt-hours.

The mileage covered, 40,787.

The average power used, per mile, 1,418 watts.

For June, 1915:

Total power consumed was 50,414 kilowatt-hours.

The total mileage covered, 47,615.

The average power used, per mile, 1,058 miles.

The Edison batteries used on the service are in some ways subjected to very hard use. The total number of cells in use at the end of the first period of three years, 5,094, and their service was the equivalent of 113,850 cell months. Seventy-six cells have been returned to the factory for repairs in these 3 years. Forty-four on account of leaks or broken seams. The balance of thirty-two cells for other causes, such as failure to charge up or broken terminals.

**Future Extensions of the Service**

Battery service would seem to overcome the weakness of electric vehicles caused by the limitations of battery capacity. This is true, but batteries with greatly increased capacity would increase the practicability of the battery service system. A local truck owner recently ran nearly down to New Haven, a round trip distance of 76 miles. On the return trip a stop was made at Meriden and the battery given a boost, for which the truck driver paid 88 cents. The truck owner afterward asker if this 88 cents was not a part of the battery service for which he had already paid. This experience brings out the possibility of an arrangement with the central stations surrounding towns under which any of the truck users could send their trucks on long trips and get boosts wherever necessary. The charge for this service would be billed to the light company furnishing the battery service and a certain proportion of this bill charged to the customer. Should other central stations in surrounding towns adopt battery service, exchange of batteries could be made and the record handled very much as in the case of railroads using cars of foreign lines.

When the subject was opened for general discussion C. E. Smith, of the Walker Vehicle Co., spoke on the results so far attained and the experience gained by his company by the new scheme which the concern has adopted in Chicago of renting batteries, selling the trucks without them and at a reduction. He outlined the plan of giving the electric garage dealer the benefit of the battery plan, and said that it has been a great stimulation to sales of these vehicles in the Chicago territory. It enables them to sell the cars at a lower first cost, and then there is a fixed montly rate for battery rental and charging.

**Mileage Makes No Difference**

W. H. Conant asked if there are any mileage limitations on the scheme, or where the car is run, or who operates it. He also wanted to know if the condition of the car made any difference in the rental charge. His idea is that the contract should not ignore accidental injury, nor should there be a definite rate for current when cars are run so differently as regards total distance by different people. He questioned as to who is responsible if the car is damaged and the battery hurt, and wondered if it was good business to sell an article of a definite life on a partial or deferred payment plan.

The answer was that there is no difference in rate, although the contract covers all emergencies, in the opinion of the Walker company.

A representative of the Edison Storage Battery Co. mentioned the new scheme entered into by the Ward Motor Vehicle Co. and the Edison company for the furnishing of the Ward electrics with the Edison battery and charging and care for a year for $875. This covers everything for the first year except an excess mileage charge when the vehicle is driven over 650 miles in any one month. They are simply trying it as a large experiment, and it is at present confined to one size of battery only.

W. P. Kennedy thought there was danger at the moment of accentuating the battery, and thought that it ought to be characterized as service.

P. D. Wagoner was of the opinion that all these new battery schemes are helpful in retiring the battery question.

# Electric Garage Should Make Owning Easy

## UP TO GARAGEMEN TO RELIEVE USERS OF TROUBLES AND UNCERTAINTIES OF ELECTRIC VEHICLE OPERATION

"The Function of the Electric Garage" was the topic assigned to R. Macrea and was of especially interest in connection with the discussions on electric vehicle problems and battery exchange plans, as there is considerable disagreement at the present time as to whether the battery exchange plan, if operated by the lighting companies, will not have a bad effect upon the electric garage business. Mr. Macrea stated as follows:

## The Function of the Electric Garage

**By R. Macrae**

By looking in the dictionary it will be seen that the word garage is derived from the French word *gare*, the primary meaning of which is to moor a ship to the dock, so that literally, an electric garage is a mooring place for electric vehicles.

The object of this paper, however, is to show that the literal meaning does not apply, and that the place from which an electric vehicle is operated should be something more than a place in which it may be tied up over night.

Usually an electric garage is a place where electric vehicles are housed, charged and washed as a fixed rate per month without regard to the amount of work that the vehicle is called upon to do, but this is not all that a garage should be. The function of the garage is not only to give the vehicle proper care, but also to keep it in proper working order. In other words, its function should be to bring the electric vehicle within the reach of all vehicle users.

To perform this function the garage must be provided with whatever equipment is necessary for making all minor repairs at a reasonable rate and without unnecessary delay, and must also be in a position to supply electric power at a reasonable rate. In addition, therefore, to being a place in which the vehicle is housed, washed and charged, an electric garage that performs its functions is a place from which the vehicle can be operated economically. It relieves the vehicle manufacturers of the expense of maintaining a repair shop in connection with every selling agency and the vehicle user of the expense and annoyance of having the vehicle tied up while a bolt or a small piece of casting is being obtained from a distant part of the country.

It most be admitted that garaging arrangements are at present generally unsatisfactory. The various schemes of battery maintenance and battery service that we hear spoken about and the claim that electric vehicles will never be entirely successful until some such maintenance system are established, go to show that at the present time batteries are not being properly maintained. In other words, that the garages are not performing their functions properly. The battery, however, is not the only part of the electric vehicle that has to be maintained, and a battery maintenance system alone will not enable the owner of an electric vehicle to operate it to the best advantage.

There are two reasons why the small garage cannot perform the functions of a garage satisfactorily. The first is, that it cannot afford to maintain an adequate equipment, and the second is that comparatively high rates per kilowatt-hour that the small garage has to pay for electric power, whether the electricity is generated on the premise or is obtained from the Central Station company.

In order to start these small garages, however, it has been customary in some cases to make claims for the electric vehicle which may sound plausible to those who know nothing about the subject but are merely absurd to anyone who is familiar with motors, batteries and electric meters. We read, for instance, that "No skilled labor is necessary to operate an electric vehicle, that in charging all that need be done is to close a switch, and that automatic apparatus will do the rest, that the cost of operating electric vehicles is independent of the mileage, that the bill for electric power will not be over $7.00 per month, and so on." Such claims create the impression that it is not necessary for a man to know anything about electricity in order to qualify as manager of an electric garage, and the result is that less intelligence or less common sense is exercised in the operation of electric vehicles than there is in the operation of any other class of apparatus for which the central station supplies power. For proof of this statement a large volume might be written with an account of the different kinds of abuse to which electric vehicles are subjected by users who have been told that a child can operate an electric vehicle.

The old horse stable as temporary quarters for the electric vehicle has done good service in showing what an electric vehicle is capable of doing under the most favorable conditions possible, but we cannot rest satisfied with it as a permanent solution of the garage problem. Instead of urging the prospective purchaser of an electric vehicle to convert the stable into a garage

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by installing a hit or miss charging outfit, one of the strongest arguments for the electric vehicle should be that the old rat shelter may be torn down and the ground sown with grass seed. Having reconciled ourselves to the loss of the horse, we should not find it so hard to part with the stable.

### Current Wholesale vs. Retail

The second factor which makes it difficult for a small garage to perform the functions of a garage properly, namely, the higher cost of electric power in small garages, cannot be left out of consideration when electric vehicles are to be operated in competition with vehicles using other kinds of power.

It is not necessary here to point out the various reasons why the small garage is obliged to sell electric power at a higher rate per kilowatt-hour than the large garage. These reasons will readily occur to anyone who gives the subject a little thought. Generating losses, transmission and converting losses and many other factors will always make the cost higher to the small garage whether the electricity is generated on the premises or is obtained from some outside source.

### Watch Current Cost

Sometimes we hear it stated that the cost of electricity is so small a part of the total cost of operating an electric vehicle that it need hardly be taken in consideration when advocating the use of electric vehicles.

In some cases this is true, but in the majority of cases it is not. Where the vehicle is used as a toy the cost of electric power is seldom a consideration that will prevent the electric from being used, and sometimes also when used for commercial purposes the cost of power is a relatively small item. For instance, a 1-ton truck doing only as much work as could be done with one horse should not use over 150 kilowatt-hours per month, which at 5 cents per kilowatt-hour, would be $7.50 per month, or only a little more than hoof pads for the horse would amount to. This same vehicle, however, if operated to its full capacity, making 50 or 60 miles every day, might use $40.00 worth of electricity, which would be an item in the cost of operation second in importance only to that of the wages paid to the driver.

### Wholesale Current Cheaper

Five cents per kilowatt-hour is as low a figure as the average garage can now afford to sell electricity for and lower than the small garage as a rule can sell it for.

The majority of central stations now make exceptionally low rates for electric power when used in large quantities and with certain restrictions in regard to the manner in which the power is used, but the small garages are not, as a rule, in a position to take advantage of these low rates.

### Useless Overcharging

Sometimes also there is an avoidable waste of electricity in small garages for which there would be no excuse in a large garage. Overcharging of batteries is sometimes carried on as if electric power did not cost anything, and frequently batteries are charged from circuits whose voltage is almost high enough to charge twice as many cells, thereby wasting one-half of the energy in resistance coils. While it is true that the cost of electricity is gradually going down in the most of our large cities, there is no immediate prospect of its going so low as to make such a waste of power seem justified under any circumstances.

It is evident, therefore, that in order to get the best that is in the electric vehicles out of them, that we must operate them from large and properly equipped garages instead of trying to maintain a separate garage for each vehicle

## Stop Knocking the Gasoline Truck and Boost the Electric

A new note was struck in the deliberations of the convention when for the first time a genuine effort was made to renounce the one-sided opposition to the gasoline truck and frank recognition of the existence of the different fields of the two classes of vehicles was given. J. W. Miller and S. G. Thompson presented a paper, "The Comparative Performance of Gasoline and Electric Vehicles in Similar Service," which gave instances in which electric trucks had given greater satisfaction than gasoline ones, and also others wherein the gasoline trucks had been found best adapted.

The discussion emphasized that there are two distinct fields for trucks of gasoline and electric type, and that one of the serious mistakes made in the past has been the trying to introduce one type where the other was better adaptable. One type cannot entirely dominate the field.

The well-balanced delivery system calls for both. The field of the electric, according to several of the speakers, is best where there are short hauls and frequent stops. The gasoline truck admittedly pays for long hauls due to its greater speed possibilities between stops. An instance of department store work was cited where a mixed system of trucks is used, the gasoline machines acting as feeders for the electrics at outlying stations. The gasoline machines handle 60,000 packages at 4.6 cents each and the electrics take care of 36,000 at 2.5 cents.

### Few Second-hand Electrics

W. P. Kennedy thinks that the proof of the pudding is that there are few electric trucks of the second-hand kind for sale. This is because almost all of them have been properly and scientifically placed, and they stay sold. He spoke of the service and used truck problems of the gasoline truck builders, and thinks electric service much better with no worry over the second-hand matter.

# Electrics That Work for Cities

## Neglected Field Promises Big Sales and Good Advertising

Municipal service as a field for electric trucks was regarded as a promising one, both as a market in itself and as an excellent advertisement for the electric vehicle. Besides fire-fighting apparatus, electric vehicles have found a place as ambulances and in various city work such as the hauling of board of education supplies and in street cleaning.

Arthur J. Slade and R. Duval Dumont presented a paper on "Electric Vehicles in Municipal Service," part of which follows:

## Electric Vehicles in Municipal Service

### By Arthur J. Slade and R. Duval Dumont

MUNICIPAL DEPARTMENTS are not operated for profit but for the benefit of and at the expense of the citizens. It is not surprising that our cities should have been deliberate, to say the least, in adopting the economical mechanical method of highway transportation, leaving the initiative to be taken by private individuals or corporations to whom vehicle transportation cost is often the determining factor in the profits and losses of the business, as is notably true in the case of express companies, contractors, coal dealers, brewers, dealers in food products, department stores, etc.

Although it is unnecessary to emphasize the point in a paper presented before this association, the report issued by the Chicago Municipal Markets Commission, appointed by Mayor Harrison, is of interest to an unprejudiced confirmation.

After showing that the city consumer pays an average of $1.90 for produce that the farmer sells for $1.00, the commission states that it costs more to haul 100 pounds of potatoes, fruit or other farm products 5 miles from the docks to the city consumer or the retail store than to ship them by boat from Michigan to Chicago, and it costs nearly half as much, 50 cents, to deliver a ton of coal from the railroad tracks to the consumer in the business district of the city as it costs to ship the coal 400 miles by rail, $1.05, from southern Illinois to Chicago.

It is estimated that in an area of less than 2 square miles in the heart of the city 150,000 tons of freight are hauled daily. About 1,000 teams are engaged in hauling food products exclusive of the delivery service of the retailers, and to make a profit for their owners, single teams must earn about $6.00 a day and double teams $8.00.

"Team hauling is decidedly antiquated, wasteful and inadequate," observes the report. "Because of the congestion existing in the streets of the central business district and the consequent inadequacy of the streets to afford free passage to vehicles, the average wagon truck spends about one-third of its time actively handling commodities and two-thirds in waiting, loading, unloading and in delays to traffic.

"Animal transportation is out of place and an archaic survival. Under present methods of hauling, food products are invariably exposed for hours to the heat of the sun. The motor truck as a carrier of food products assures to the consumer better food, lower prices, and a lower cost of hauling. Detailed comparisons showing the cost of hauling by horses and wagons and motor vehicles indicate that the average cost of haul

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ing in the city by motor is 11¾ cents per ton-mile as compared with 17¼ cents by horse, a saving of 36 per cent."

The economies effected by the use of commercial vehicles having been conclusively proved over a period of years in private business, numerous municipalities under administrations desirous of operating city departments as efficiently as circumstances may permit, have recently been installing commercial vehicles to a very noticeable extent.

This paper will touch briefly on the equipment of the following classes of municipal service and will endeavor to indicate how and where the storage battery electric might be more extensively used with attendant economy in operation and maintenance:

Fire department.
Street cleaning and refuse collection.
Police patrol.
Hospital ambulance service.
Board of education.
Department of water supply gas and electricity.
Department of public works, bureau of highways, etc.
Government printing office.

### Street Cleaning and Refuse Collection

The use of motor vehicles and especially electrics in street cleaning operations has not yet become general, in fact, may be considered to be in an experimental stage. The usual mechanical methods employed for cleaning streets are sweeping with rotary broom behind a water sprinkler to lay the dust; scrubbing with a rotary rubber squeegee in connection with a liberal water supply from a sprinkling tank which is a component part of the apparatus; flushing at 30 to 40 pounds water pressure from a tank supply, the nozzle pressure being obtained by a power-driven pump, though in some instances a tank pressure is obtained when filling from the hydrants if the pressure in the water mains is sufficient. It is with this latter system that the limited number of electric street cleaners in North America have been equipped, and Canada probably has as many such vehicles as the United States. Few figures of operating cost are available, but it is obvious that as the duty of these electric vehicles is merely to transport gradually diminishing loads of water, the economy is as great as that of any merchandise carrying electric for similar mileages. The time of filling is practically the same as discharging, so that at 10 miles per hour during an 8-hour day a battery capacity of 40 miles per charge is all that is required. The use of a power-driven pump would require a duplicate battery equipment with means for quick interchange, as a discharge of 300 gallons per minute at 40 pounds would require about 10 horsepower, allowing 50 per cent combined efficiency of motor and pump, or 30 kilowatt-hours extra battery capacity. With adequate facilities for recharging, boosting and interchanging batteries of various capacities so that weather, grade and pavement conditions can be compensated for, it is not at all impossible that certain municipalities might find such a system very advantageous not only for flushing but for sweeping and scrubbing, as well as for other operations.

Mr. Robert Mackay, superintendent of electric light, city of Calgary, Canada, supplies the following figures on trucks in municipal service in that city:

| Capacity tons | Cost to date | Average per month | Total miles | Nos. in service | Cost per mile |
|---|---|---|---|---|---|
| 1 | 1933.03 | 214.78 | 7,176 | 9 | 0.2692 |
| 1 | 1955.85 | 217.32 | 7,061 | 9 | 0.2769 |
| 3 | 2468.76 | 274.31 | 5,080 | 9 | 0.4860 |
| 3 | 2417.52 | 268.61 | 5,375 | 9 | 0.4516 |
| 5 | 2997.29 | 233.03 | 4,581 | 9 | 0.6542 |
| 5 | 3033.54 | 337.06 | 5,855 | 9 | 0.5011 |
| 5 | 2564.58 | 284.95 | 5,208 | 9 | 0.4924 |
| 5 | 885.59 | 177.12 | 1,475 | 9 | 0.6004 |

It will be observed that the mileage covered by these vehicles is very low, being from one-third to one-half of their mileage capacity, and in consequence the cost per mile is high. Garage expense, drivers' wages, estimated depreciation, figured at 20 per cent, and similar fixed charges and distributed over too short a mileage to show marked economy.

The report of the Electric Vehicle Commission of England mentions an installation of 30 electric "watering vans" in a continental city not mentioned by name. The report states that "In the city referred to, each electric watering van waters about 49,000 square yards of road surface per day of 8 hours, as against 30,000 yards, the best average of horse-drawn van. The saving stated to result from employing electrics in place of horse-drawn vans for this purpose by the municipality mentioned is about $400 per electric van per year.

In the matter of refuse, collection tests have been made in several American cities to determine whether house to house collection of ashes, garbage and rubbish, as well as collection of sweepings at street intersections where same is usually deposited, can be more economically performed by mechanically propelled vehicles than by horses and carts. While it is unquestioned that for this service the battery electric is more economical than the gasoline machine, neither one has yet proved its advantages over the horse and cart, so far as the authors of this paper have been able to learn.

The interest on investment, amortization and other fixed charges appear to be too high to justify the use of motor vehicles for the limited mileage possible in this service, the restricted hours of operation, and the idle loading periods.

THE COMMERCIAL VEHICLE in its issue of August 14, 1914, gives details of the operation and cost of house to house refuse collection of a motor truck compared with horse trucks. The performance was personally observed by the investigator and the figures were taken from the records of the New York Street Cleaning Department. The figures are as follows and show that the horse cart cost is lower than motor truck cost:

**Gasoline Truck**

| | |
|---|---|
| Gasoline | $2.415 |
| Oil | 0.746 |
| Depreciation at 20 per cent | 2.777 |
| Interest at 6 per cent | 0.833 |
| Repairs, labor and materials, tires, grease and miscellaneous | 4.068 |
| Garage rent | 0.300 |
| Drivers pay per day | 2.560 |
| Four helpers at $2.00 | 8.00 |
| | $21.699 |

**Horse Cart**

| | |
|---|---|
| Feed, oats | $0.407 |
| Feed, hay | 0.198 |
| Straw | 0.027 |
| Hostlers and stablemen | 0.382 |
| Shoeing at $1.60 per month | 0.053 |
| Veterinary | 0.019 |
| Depr. 6½ years life at cost of $285 | 0.122 |
| Interest on horse at 6 per cent | 0.048 |
| Wagon depr., 6½ years life, cost $123 | 0.053 |
| Interest on cart at 6 per cent | 0.021 |
| Harness depr., $23 per set, life, 2 yrs | 0.032 |
| Interest on harness at 6 per cent | 0.004 |
| Stable rent | 0.300 |
| Wagon repairs and repainting | 0.091 |
| Driver per day | 2.560 |
| | $4.317 |

Gas car carried to dump 24 tons per day.
Cost per ton, $0.92.

Same service could be obtained from horse-drawn vehicles for $0.799 per ton.

Upon withdrawing the motor truck from house to house service and placing it in transfer service with a crew of three helpers instead of four, made the total daily truck cost $10.69. It has been found that the work covers 54 miles per day, hauling a total of 26.6 tons, or $1.03 per ton. The cost of transporting an equal tonnage for the same routes by horse and cart is $1.56, an increase of more than 50 per cent over the motor truck cost.

These opinions are concurred with by the English report quoted as follows:

"It should be obvious that in replacing horse-drawn vans and carts with motor vehicles, no matter whether they be *petrol, steam or electric, the latter will show the best results where the refuse destructor is at a distance from the area of collection, the saving, of course, being in the high speed at which the motor vehicle can traverse this distance and its greater carrying capacity. It is quite possible on this account that in some towns the best economy might be obtainable by a combination of ordinary horse-drawn vehicles for the districts in propinquity to the destructor, with the use of electric vans for the districts further away. Possibly in the latter districts, also, the local collection could be best done by horse vehicles conveying the material to a central depot from whence it would be transported to the refuse destroyer by large electric vehicles. An arrangement of this latter sort has been in successful operation in a large continental city for some time. The horse carts are provided with removable box bodies, so that when the cart arrives at the depot the body is lifted off it by an electric crane and placed upon the flat platform of a large electric vehicle, which, when it has received its full complement of these full boxes, proceeds on its journey to the destructor. In the meanwhile empty box bodies are placed upon the tumbrils, which once more proceed upon their rounds of collection."

In opposition to this view, however, the same report states:

"Electric vehicles have been employed to a considerable extent on the Continent for refuse collection. The largest installation is in Paris, where the municipality possesses a fleet of 100 electric refuse-collecting vehicles. Each has a capacity of a little over 15 cubic yards to the ton, makes the total load of the full vehicle not less than 5 tons. The vehicles perform their work during the night hours, each vehicle covering about 25 miles nightly, with an energy consumption per vehicle mile of from 1.5 to 1.7 units. This system of collection was adopted as the result of a very careful trial made by the civic authorities which showed that considerable economy would be obtainable by the use of electric vehicles.

"In December of last year some interesting trials were made of the use of electric vehicles for the collection of house refuse in Birmingham. The trials are dealt with in an excellent report presented to his committee by Mr. Jackson, the superintendent of the Refuse Disposal Department, wherein he sums up the results in the following paragraph:

"The three tests confirmed my opinion that electric vehicles have established themselves sufficiently to justify municipalities giving their support, perhaps at present in a somewhat limited degree, to their development."

Promising phases of the problem to be investigated and analyzed include:

Method of final disposal.
Traffic conditions and the limitations on design effected thereby.
Living conditions and effect of characteristics of inhabitants on motor vehicle design.
Effect of variation in weather conditions.
Seasonal variations in quantities of different classes of refuse.
Type of street pavements and variations in grades.
Functions required of the equipment.
(a) Refuse collection and transportation.
(b) Cleaning streets.
(c) Snow work, plowing, sweeping or carting

An investigation along these lines in one of the districts in New York resulted in the design of a tractor-trailer system, now being installed in service, by which house-to-house collection and transportation to point of disposal will be performed by day and various street cleaning operations at night. Thus the tractors will be

(Continued on page 33)

*English nomenclature for gasoline.

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## The Electric From Now On

SHALL electric trucks continue to be sold in competition with gasoline trucks, or shall they be handled like other electric equipment? The present position of the electric vehicle industry is far behind that occupied by the gasoline commercial vehicle business. Gasoline trucks are daily being sold for work in which the electric is better adapted. The fault cannot be that electric trucks are not equal to requirements, for where they are properly used they are effecting large economies.

Some of the difficulty may be attributed to the short-sighted policy adopted by a few of knocking the gasoline vehicle in the hope of stimulating electric truck sales; part of it is due to the high prices demanded for electrics; but the main thing is that electric vehicle interests have not made it easy to own electric trucks.

It has been easier to own gasoline trucks, although ample demonstration has been given of the fact that in some services electrics are cheaper to maintain in spite of their necessarily higher first cost.

It has been possible to buy supplies for gasoline trucks anywhere. Satisfactory mechanical service has been readily available. It has been easy to pour gasoline in a tank.

The electric has been difficult to own unless extensive fleets were maintained, which accounts for the large percentage of electrics so maintained. At the Electric Vehicle Assn. Convention, just closed, the former cry for central station co-operation was changed to a plea for the central stations to take over both the sales and service functions of the electric vehicle trade. Why not?

The gasoline truck can be sold by independent and competing dealers successfully because the vehicle is by its very nature independent. Its owner can buy his supplies where and of whom he chooses Not so the electric. Except in isolated instances, the electric owner must depend upon the local lighting company to supply him with electric current which he uses. He must go to one of a small group of battery makers for expert technical assistance and supplies for his battery.

Formerly, when wood and coal, which can be purchased anywhere and of myriad dealers, was the fuel, cooking ranges were sold by all manner of vendors; but since gas fuel has been standardized the necessity of securing it from one concern with a monopoly naturally led to the prevalent practice of disposing of gas ranges through the lighting companies. The same is true of electric appliances such as lamps, fans, fixtures, vacuum cleaners, etc., and may eventually extend to that most profitable of all electric energy consumers, the electric vehicle.

The convention in Cleveland was more of a central station gathering than a manufacturers' meeting. It is quite possible that the future of the industry is in the lighting companies' hands.

## Hit a Head

CHARACTERISTIC ignorance is shown by one of the great New York dailies in an editorial which appeared recently in an evening edition It states that one of the largest items of running expense for the city is the cost of repairing worn-out streets, running into $2,000,000 annually and even then not sufficing to keep the streets in good shape, and then draws the conclusion that the reason for the great cost of repairs and the necessity of them is the practice of overloading trucks. Expanding on this premise it discourses at length on the destructive cutting effect of on overloaded tire, of the manner in which the street surface is caved in by the enormous loads carried by motor trucks and expresses regret that the McAneny ordinance did not pass.

The truth is that the use of rubber as a tire material positively prevents excessive overloading of motor truck wheels by the very limitations of the material, and that it is steel-tired horse vehicles which are overloaded about 400 per cent beyond what is possible for rubber tires to sustain, per inch or width; that the ordinary street cars which must be sustained by the same foundation which carries vehicular traffic weigh 18 tons apiece, without their 4 to 6 tons of passengers, as against a maximum gross weight of about 15 tons for the heaviest types of motor trucks; that the rutting and chipping of street surfaces is due to the effect of heat and cold, some of the most severely-rutted roads in the vicinity of New York being confined exclusively to light passenger car traffic; and that the carrying of heavy loads of merchandise is essential to the economical conduct of the business of the city, necessary, indeed, for its very life; the gravest thing to be pointed out is the appalling ignorance of these things on the part of the public press and the reading public.

Something is wrong with New York's streets. The public knows it and clamors for improvement. The reply is an unfair and ignorant attack on trucks.

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# Designing Trucks for Safety First

## Detroit Police Official Has Model Traffic Rules

DETROIT, October 22—On the second day of the convention of the Safety First Federation of America, being held here, Police Commissioner John Gillespie of Detroit suggested a model street traffic ordinance and Chairman Karl W. Zimmerschied of the Standards Committee of the Society of Automobile Engineers pointed out the contribution of the engineer to the movement for safety.

The model ordinance of Commissioner Gillespie contained the following provisions:

1—Education and instruction of policemen before assigning them to traffic duty.
2—Standard code of hand signals to be used by traffic officers.
3—Fixed locations for traffic officers at intersections to be plainly marked.
4—Elimination of glare of head and side lights.
5—Use of muffler cut-outs to be prohibited.
6—Standardization of left-hand turns at intersections.
7—Near-side stops for street cars.
8—Rear lights on all horse-drawn vehicles.
9—Elimination of steps on all horse-drawn wagons and motor trucks.
10—Standard color, size, design and means of attachment for all street traffic signs, including school, hospital, church, safety zones, fire hydrants, railroad and street railway crossings, alley, mailbox, playground, crosswalks, parking, etc.
11—Designation of safety zones and crosswalks as embodied in the Detroit plan of painting.
12—Education of the public to use crosswalks and authorization of the police to control pedestrian travel as provided in Section 2 of the Detroit traffic ordinance.
13—Standard traffic ordinance and code of regulations for adoption by all cities.
14—Licensing of drivers and operators of all motor vehicles.
15—Extensive use of sirens as police and fire whistles.
16—Standardization of accident reports by municipalities.
17—Chain guards on vehicles driven by side chains.

Mr. Zimmerschied suggested four regulations as follows:

1—Standard license plates and methods of attaching them
2—Standard gearshift gates on progression.
3—Standard location of engine and car numbers.
4—Anti-glaring provision for headlights.

In his address Mr. Zimmerschied stated that the engineer contributed largely to the safety of a car by proper design of steering and braking members, by selection of steels and other materials, by better proportioning of parts with an eye to safety, by improved suspension such as causes vehicles to hold the road better, and by placing the driver to the left instead of to the right.

His idea in regard to gearshift gate standardization was that it was most distressing for a driver used to one plan of gear progression to have to adapt himself to another. He also emphasized the importance of placing the accelerator pedal in a standard location to avoid the manipulation of it when the driver means to apply the brake or disengage the clutch. Throttle levers on the steering wheel should all operate in the same way also, he stated.

### GOTHAM GETS TRAFFIC SEMAPHORES

NEW YORK CITY, October 18—Automatic street signals for the control of traffic were in operation today at nearly all street corners where traffic policemen are stationed. The signals are a white standard with four arms, two of them red with the command Stop in white letters and two of them green with the order Go.

They are operated by the policeman on the corner, who turns a handle which swings the signal, and the letters are large enough so that the signals project over the street at a height to be read by all drivers.

### LAX FERRY RULES MENACE MOTORS

NEW YORK CITY, October 21—For allowing drivers of motor vehicles to stay their motors before ferries have docked, owners of ferries in the waters about New York are being fined $500 for each offense. There is a federal statute against the practice which permits ferry operators to refuse passage to motor vehicles until their tanks have been drained. It is stated that some of the ferry companies will inforce this rule if drivers continue the infraction of the law.

### TO MAKE TRUCK WHEELS

DETROIT, October 26—The Hayes Motor Truck Wheel Co. has been formed in St. Johns, Mich., with a capital of $100,000 for the manufacture of wood wheels for commercial vehicles. C. B. Hayes is president; N. S. Potter and W. C. Morrey, first and second vice presidents, respectively, Mr. Morrey also having the title of timber manager; A. D. Smith, secretary-treasurer and general manager, and H. J. Keller, superintendent. The concern is occupying the factory of the St. Johns Mfg. Co. and expects to be in operation by November 1. A sawmill will be operated in conjunction with the plant.

### PAGE NEW DEPARTURE PRESIDENT

HARTFORD, CONN., October 20—DeWitt Page has been elected president of the New Departure Mfg. Co., Bristol, Conn., to succeed A. F. Rockwell. At the same meeting of the board of directors in which this change was made, A. C. Hitchcock was elected to succeed Mr. Page as secretary and the remaining officers were re-elected. The directorate now includes DeWitt Page; C. T. Treadway, treasurer of the concern; F. P. Furling, the vice-president; Charles F. Pope; E. R. Burwell; A. C. Hitchcock and Townsend G. Treadway.

### HOOSIER SUCCEEDS B-T-K

INDIANAPOLIS, IND., October 19—The Hoosier Auto Parts Co., Muncie, Ind., has been formed and incorporated with a paid-up capital of $100,000 to succeed the B-T-K Gear & Engine Co., of Muncie. The assets of the defunct B-T-K concern were bought up by the incorporators, George A. Hall, Karl A. Osterle and Fred J. Lesh, who also subscribed to the stock. The concern will manufacture steering gears, control sets, clutches, universal joints, will do nickel, copper and brass plating, and will undertake to give service to owners of parts turned out by the B-T-K company.

### GASOLINE FAMINE IN PARIS

PARIS, FRANCE, October 9—Dealers in motor fuels have this week failed, for the first time since the beginning of the war, to secure supplies of gasoline. The shortage is attributed to the requisitioning of all available supplies by the military to cover the enormous demands made upon them by the recent operations in the Champagne and Arras districts; by the aerial activity and the preparations for an advance. When the war began gasoline was 33 cents per gallon. It is now selling for 42 to 45 cents, and many dealers refuse to sell more than 1 gallon to any one buyer. Benzol, which is used largely for commercial vehicles, has disappeared entirely.

# Traction Men Hold Up Bus Franchise

## Extra Hearing Set for Nov. 8 To Hear Objections

NEW YORK CITY, October 22—The franchise approved by the franchise committee of the Board of Estimate of the City of New York for additional and competing bus lines has been delayed by the granting of a second public hearing on November 8. This action has been taken in response to representations made by representatives of the interests back of the present traction lines, the new dual subway system and the Fifth Avenue Coach Co.

The franchise committee rejected the offer of the Fifth Avenue Co. in favor of that of the New York Motor Bus Co., Roland R. Conklin's organization. The New York Motor Bus Co. offered a 5-cent fare for short hauls and a 10-cent fare for longer distances. It also proposed to give the city the right to force extension of lines if so decided. A certified check for $60,000 was deposited with the city as proof of good faith.

A number of new routes along different streets from those now served by the Fifth Avenue buses were outlined, among which was the much-needed link between the Grand Central Terminal of the New York Central and New York, New Haven & Hartford lines and the Pennsylvania Terminal, used by the Pennsylvania railroad and the Long Island Railroad.

The company offered an initial payment of $35,000 to the city as against $25,000 by the Fifth Avenue company. The contract asked for runs for 15 years with the privilege of renewal for 10 years more. The Fifth Avenue company offered 21 miles of extensions of its present lines while the New York company offered 31 miles.

The objections were made by R. W. Meade of the Fifth Avenue company and Guthrie & Quackenbush, counsel for the Interboro Rapid Transit Co., on the grounds that having an interest in both the subway system and the proposed bus line, the city would be competing against itself.

Brainbridge Colby, representing the New York company, replied that the decision of the city must depend upon the traffic needs of the city and not upon vested interest in straphangers.

President of the Board of Aldermen George McAneny brought out the real animous back of the Interboro interference when he pointed out that as owners of the Fifth Avenue Coach Co., which strove hard to secure similar franchises to those proposed for the New York company, that the Interboro had proven itself in favor of additional bus lines competitive with the existing and future traction lines, but that its opposition was based upon the fact that other interests instead of the Interboro were to secure the franchise.

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# Ford Casts Grey Iron Direct From Ore

## New Process Produces Better Product at Less Cost

DETROIT, October 22—A process has been discovered and put into actual operation by the metallurgists of the Ford Motor Co. by which grey iron is cast directly from the ore. By one heat the crude ore as it comes from the mine is transformed into a finished casting for a cylinder block, a crankcase, etc.

"The perfection of the process marks a metallurgical epoch," says a Ford official.

"Not only have fine gray and malleable iron castings been produced direct from the initial heat of the blast furnace, but the iron made in this manner is of finer quality and of more strength than the old iron made from the blends of the blast furnace products.

"Gray and malleable iron with a test of 28,000 to 30,000 pounds to the square inch is regarded as good iron. That which has been produced by the Ford organization has a test of 33,000 pounds.

"Some months ago Mr. Ford, together with some of his manufacturing organization, was visiting a few of the large iron and steel industries when the question arose why it was necessary to again reheat and remelt the products of the blast furnace, which is the first convertion of iron ore.

"Is it not possible to get the kind of iron you want directly without the waste of that initial heat?" was Mr. Ford's inquiry.

"Thereupon he was informed that it couldn't be done.

"Why?" he demanded.

"It is impossible," said the iron men to whom he was talking.

"Mr. Ford scuffed the toe of his shoe on the floor and smiled his slow smile, and turning to his engineers, said, 'Because it has not been done is all the more reason why we should try. Go to it.'

"The organization went to work quietly. The process was more than a laboratory affair. It was an experiment on a scale the magnitude of which may be guessed from the fact that 16 tons of iron were used in the initial trials.

"An idea of what this change means to the Ford Motor Co. may be gained when it is known that this plant uses approximately 700 tons of gray and malleable iron daily.

"The blast furnace is the most economical way to reduce iron ore. Coke is the economical fuel.

"In reducing the ore the base of all finished iron and steel is formed. From this comes gray iron, malleable iron and steel products.

"The only way to get a uniform product, before the Ford process, was to sort out the various kinds of iron that the blast furnace produced and then blend them by remelting, this calling for two heatings of the iron, the first being when it came from the ore, and the second in the cupola. The Ford process omits the second melting entirely.

"Gray iron is used in parts where flexibility is not required, cylinders and machinery construction in general. Malleable iron is used where a light degree of flexibility is required and steel where strength, flexibility and hardness are necessary.

"It hasn't been practical, and has been put down as impossible, to put blast furnace iron into finished gray iron or finished malleable direct. It is practical in steel making when the Bessemer of Duplex process is used.

"The Ford Motor Co. has now evolved the method of putting this finished blast furnace iron into fine gray and malleable iron as the case may be. It has brought into play most of the processes now used in steel making in such a way that economy can be effected so that a saving is obtained over the present cupola practice of remelting.

"The elements that have been hard to control heretofore with any degree of economy: carbon, manganese, silicon, phosphorus and sulphur, are eliminated or reduced in a few minutes to the point where desired, or can be brought up to that point, as the case may be, at a very minimum expenditure of time and energy.

"From the time the iron ore is put into the blast furnace until the finished metal is poured but one heat is used."

### KANSAS HAS 2,487 TRACTORS

TOPEKA, KAN., October 11—J. C. Mohler, secretary of the State Board of Agriculture, has completed a census showing 2,487 tractors in the state on March 1. Barton county, the leading wheat producing county, has the largest number, 123. The larger number of tractors is in the corn belt. Thirty-seven counties in that district have 1,209 tractors.

### TOURING WARD REACHES SIXTH CITY

CLEVELAND, October 18 — The Ward Special 750-pound electric commercial vehicle which opened the Electric Exposition & Motor Show in New York City on October 6 by starting on an overland trip to Cleveland to open the Electric Vehicle Assn. convention there, rolled into Cleveland yesterday after 11 days on the road, having covered a distance of 733.7 miles in that time. This is an average of 66.7 miles per day. The actual running time was 84 hours 43 minutes, making an average speed of 8½ miles per hour for the whole distance.

### Coming Commercial Vehicle Events

| | |
|---|---|
| Nov. 16..... | Newark, N. J., Monthly Meeting, Motor Truck Club of New Jersey, Automobile Club, 22 Washington place. |
| Nov. 17..... | New York City, Monthly Meeting, Motor Truck Club of America, Automobile Club of America. |
| Nov. 18..... | New York City, Met. Sec. S. A. E. Meeting, Automobile Club of America. |
| Nov. 29-Dec. 4.. | Electrical Prosperity Week. |
| | 1916 |
| Jan. 8-15..... | Cleveland, O., Show, Wigmore Coliseum. |
| Jan. 8-15..... | Philadelphia, Pa., Show. |
| Jan. 29-Feb. 5... | Columbus, O., Motor Vehicle Show. |
| Jan. 29-Feb. 5... | Minneapolis, Minn., Motor Vehicle Show. |
| March 4-11..... | Boston, Mass., Motor Vehicle Show, Mechanics' Hall. |

# Bay State Has 11,150 Motor Trucks

## Gain of 2,914 Over Whole of 1914 in 9 Months

BOSTON, MASS., October 16—According to figures just compiled by the Massachusetts Highway Commission, there is a very substantial gain in the use of commercial motor vehicles in that state. For the first 9 months of 1915 more trucks have been registered than during the entire year of 1914. And the gain over the first 9 months of 1914 is remarkable. It proves that business conditions in the Bay State are very good. From January 1 to October 1, last year, 7,813 commercial vehicles were registered. For the entire year of 1914 there were 8,236 listed, a gain of 423. For the first 9 months of this year the figures show 11,150. This is an increase of 2,914 over the entire year of 1914 and 3,337 more than for the same period of last year. Here are the figures tabulated:

| Commercial Vehicles | |
|---|---|
| Jan. 1 to Oct. 1, 1914..... | 7,813 |
| Entire year 1914..... | 8,236 |
| Jan. 1 to Oct. 1, 1915..... | 11,150 |
| Gain over entire 1914..... | 2,914 |

### TRUCK KEEPS UP WITH TOUR

KANSAS CITY, MO., October 20—The most interesting feature of the recent tour of the Kansas City Automobile Dealers Assn. through western Missouri and eastern Kansas was the presence among the cars of a G. M. C. ¾-ton truck. It was freely predicted at the beginning that the truck, including blocks, tackle and the baggage of seventy men, would prove an embarrassment in the rate of speed to be made, and probably otherwise. Everybody was surprised to find that these predictions were not verified. The truck never came in over 15 or 20 minutes behind the rest of the cars, and frequently was right up with them. It made the entire trip without the touch of a wrench. It rained twice during the trip, and at one place, in the Marie des Cygnes bottoms, between Ft. Scott and La Cygne, Kan., where several wagons were stuck and where the entire party was held up for 30 minutes until a threshing machine was extricated, the G. M. C. car had no trouble whatever.

There were favorable comments all along the line and lots of enthusiasm was shown for the big car, which was driven by Fred Hickenberry and was in charge of Mt. Estel Scott, the manager of the Kansas City office of the G. M. C. company.

### QUAKERS STUDY WORMS

PHILADELPHIA, October 22—To study the Sheldon worm-driven axle as used on Garford trucks, fifty owners and drivers attended a meeting at the service station of the Garford-Philadelphia Co. to hear an address by E. A. Shelly, advertising manager of the Sheldon Axle & Spring Co.

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# 218 Per Cent Increase in Chase Business

## New 1-tonner Follows Lines of Other Trucks Produced

SYRACUSE, N. Y., October 21—A business increase of 218 per cent over the last fiscal year was announced at the directors' meeting of the Chase Motor Truck Co., held here recently. The fiscal year of 1915 ended October 1. Much of this increase is attributed to the adoption of a standard line of four-cycle water-cooled, worm-driven models 2 years ago in place of the two-cycle air-cooled, chain-driven line produced the 8 previous of the 10 years of the existence of the Chase company, although there were naturally difficulties incident thereto. The increase is all the more remarkable in view of the fact that the Chase company has shipped no chassis to any of the warring powers, all of its export business being of a purely commercial nature.

Coincident with the above announcement comes that of a new model of 1 ton capacity in addition to the ¾-, 2- and 3½-ton models. The new truck is designated Model A and follows the lines of the other models very closely.

It has a four-cylinder unit power plant with block cylinders, 3½ by 5⅛, and drives through a Sheldon worm-driven rear axle, torque and propulsion being taken by the springs. It has a governor and both hand and foot throttle control. Its wheelbase is 140 inches and it carries 36 by 3½ tires in front and 36 by 5 in the rear. Bosch ignition a Holley carbureter, Brown-Lipe gearset and Sheldon axles and springs are employed.

### LOCO GAINS 12%

BRIDGEPORT, CONN., October 25—The past fiscal year has been the most prosperous in the history of the Locomobile Co. of this city. Although a portion of this is due to war orders, both for passenger cars and trucks, it is stated that domestic business gained 12 per cent over last year up to August 31. It is understood that nearly 700 of the new worm-driven 3-ton trucks have been shipped to the Allies.

### $3,713,742.22 PACKARD SURPLUS

DETROIT, October 22—With assets at $21,814,153.71, the Packard Motor Car Co. closed its 1915 fiscal year August 31, 1915, with a surplus of $3,713,742.22, an increase of over 50 per cent over last year. Nearly 8,000 trucks were built in 1915, including war orders

### 8,000 COMMERCIAL PACKARDS

DETROIT, October 23—Since Packard trucks were first placed on the market, 10 years ago, close to 8,000 of them, valued at nearly $20,000,000, have been sold for commercial use, according to a statement made by C. R. Norton, truck sales manager. These are exclusive of the trucks sold for export.

### SANFORD STOCKS A BUS

SYRACUSE, N. Y., October 21—The Sanford Motor Truck Co., of this city, has announced a stock bus body for application to its 1,500-pound chassis. This action is in line with several similar announcements from other truck makers and responds to the demand for hotel, estate, school and passenger-traffic buses of medium size but modern and complete equipment.

The new Sanford bus is of the closed variety with a near-side pay-enter door on the right side at the front. It seats fourteen passengers on longitudinal seats upholstered in real leather and is lighted by electric dome lights. The interior is trimmed in mahogany finish and painted Brewster green on the outside. It has practicable drop windows all around, operated by a strap as in fine coaches, all having nickel handles and anti-rattlers. An unusual feature in motor buses of this type is electric push-button signals adjacent to all seats.

### 700 SAURERS FOR RUSSIA

PLAINFIELD, N. J., October 23—The International Motor Co. of New York City has closed an order for 700 5-ton Saurer trucks for Russia, to be built in the Saurer plant here.

### LATEST TRUCK IS TOWER

DETROIT, October 23—The Tower Motor Truck Co., of Greenville, Mich., of which R. J. Tower is the moving spirit, has recently completed the first experimental model of the Tower truck. The new vehicle is equipped with a Continental motor and Timken axles and has a wheelbase of 135 inches.

### GERSIX TRUCKS ON COAST

PORTLAND, ORE., October 18—A 2½-ton assembled truck to sell for $2,500 and incorporating a Buda six-cylinder power plant and Sheldon worm drive has been announced by the Gersix Co., of this city. Edward E. Gerlinger heads the new company and a location in the two-story building formerly occupied by the Pierce-Arrow dealer has been secured.

Orders are in for 100 Buda power plants and a number of Sheldon axles. The company will also conduct a repairing and second-hand truck business.

### BUCKEYE MAIL MOTOR DELIVERED

COLUMBUS, O., October 11—Seven trucks replaced horse-drawn wagons in the transfer of mail to and from local railroad depots October 1, when the new contract for this work went into effect. There are now 17 trucks engaged in carrying mails for the Columbus post office. But two single-horse wagons, delivering parcel post matter in the business district, are now used by the local postal department.

Postmaster Kinnear said the mails were out 30 minutes earlier in the morning as the result of the difference in speed of the motors over the horses. Anson B. Coates has the new mail transportation contract.

### HAUGHTON A NEW 1-TONNER

MARION, O., October 16—L. R. Wottering has been retained by the Maughton Sulky Co. of this city to design a 1-ton truck to be produced about the first of the year. Features of the truck will be a long wheelbase and a floating type of rear axle.

### FROM SLEIGHS TO TRUCKS

BINGHAMTON, N. Y., October 16—The Sturdevant-Larabee Co., which has made sleighs and wagons in this city for 40 years, has been reorganized as the Larabee-Deyo Motor Truck Co. to produce a 2-ton gasoline truck.

# Reduced Prices for I. H. C. Trucks

## Increased Production Due to Additions to Plant

CHICAGO, October 22—Sweeping reductions have been made in the prices for the motor trucks produced at the Akron, O., plant of the International Harvester Co. Previously these vehicles have not been given any published list price, but on the eve of greatly increased production made possible by two large six-story additions to the Akron plant, the company has announced a scale of prices below those formerly quoted.

Changes in the chassis, already announced, are the use of 36-inch wheels on all models instead of the higher ones formerly employed and the option of either solid or pneumatic tires.

The present line and prices follow:

1,000-pound two-cylinder air-cooled, $600 with body.

1,000-pound two-cylinder water-cooled, $710 with body.

1,500-pound two-cylinder water-cooled, $950 with body.

2,000-pound four-cylinder internal-gear-driven, $1,500.

A fact not generally known is that the Akron plant of the International Harvester Co. manufactures solid rubber tires for I. H. C. trucks and is said to be the largest solid rubber tire producing plant in the world.

### HUFF LEAVES PACKARD

DETROIT, October 23—Russell Huff, who has been associated with the Packard Motor Car Co. since its inception and has taken out a large number of patents assigned to the Packard company, has resigned as consulting engineer to become chief engineer for Dodge Bros.

Mr. Huff designed the first car produced by J. W. Packard at the Warren, O., plant and for many years was chief engineer of the Detroit plant.

### NEW BAKER-R. & L. DIRECTORS

CLEVELAND, October 25—At the annual meeting of stockholders of the Baker-R. & L. Co. here last Tuesday, J. H. Wade, W. J. Mather, D. Z. Norton, J. H. Kling and C. L. F. Wieber, Jr., were elected to fill vacancies in the directorate.

### EARL AN OVERLAND DIRECTOR

TOLEDO, O., October 26—C. A. Earl was made a director of the Willys-Overland Co. and one of the vice presidents at the annual stockholders' meeting held here this afternoon. The present officers were re-elected and the following were elected on executive committees: John North Willys, H. T. Dunn, H. T. Shepler, C. S. Jameson, R. R. Scott and Walter Stewart.

### CONTINENTAL PAYS 100%

DETROIT, October 20—At a meeting of stockholders of the Continental Motor & Mfg. Co., Detroit and Muskegon, Mich., held here yesterday, it was decided to increase the capital $500,000, making it $2,900,000 instead of $2,400,000. A stock dividend of 100 per cent was declared. The surplus was $1,200,000, an increase of $500,000 over last year.

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# 300 Strike at General Vehicle Plant

## Sympathetic Strikers Demand Shorter Working Day

NEW YORK CITY, October 21—Over 300 men employed in the shops of the General Vehicle Co., Long Island City, N. Y., have gone on a sympathetic strike on account of the labor troubles at the Schenectady works of the General Electric Co., of which the General Vehicle Co. is a subsidiary.

While the main condition for which the strikers are holding out is that the workers at the up-state plant shall be granted their demands, the vehicle men also demand a 48-hour week instead of a 58-hour one for themselves. The plant employs 1,000 men.

### PEERLESS MEN WALK OUT

CLEVELAND, October 22—Because demands for an 8-hour day and other concessions were refused, 1,000 employes of the Peerless Motor Car Co. here went on strike today.

### STEARNS WAGES ADVANCED

CLEVELAND, October 23—Employes of the F. B. Stearns Co., maker of Stearns-Knight trucks and cars, to the number of 1,000 have been given a 48-hour week with pay for 55 hours and time and a half for overtime. The night shift hereafter gets straight time and a half. The new order went into effect October 16.

### RUBBER MEN GET RAISE

AKRON, O., October 25—Akron rubber manufacturers have voluntarily increased the pay of machinists in their plants 15 per cent. This will affect about 1,500 men and amounts to about $1,000 a day.

### FIRST BUS FRANCHISE UNDER NEW YORK LAW

NEW YORK CITY, October 23—The first franchise to be awarded under the new jitney law recently passed by the state legislature has been granted by the Public Service Commission to a line shortly to be operated in New Rochelle, N. Y., a suburb of New York City, and famous as the scene of Cohan's historic farce, "Forty-five Minutes from Broadway."

Four buses are to be operated, these to be of the pay-enter type, seating from ten to seventeen persons. They will be run from 6:30 a. m. to 1:30 a. m. on a 10-minute schedule. The franchise runs 10 years and provides that the company shall pay the city 3 per cent of the gross earnings.

### GASOLINE FROM NATURAL GAS

DALLAS, TEX., October 23—Several plants for the manufacture of gasoline from casing-head gas, or that which comes from the wells with crude oil, are being started in Texas, and it is said that there are some fifty such in Oklahoma. In California there are said to be twenty more.

By the new process, this gas formerly a waste product, is condensed into a highly-volatile gasoline running from 75 to 90 Beaume, which is later reduced to 60 degrees by naphtha treatment. It takes about 500 cubic feet of gas to make 1 gallon of fuel. It is stated that the Oklahoma plants are producing 80,000 gallons of gasoline daily and those in California 35,000 in this way.

### SAFEGUARDING ROADS IN WINTER

WASHINGTON, D. C., October 21—Water, not cold, is the cause of the deterioration of roads in winter, according to the road specialists of the United States Department of Agriculture. Cold weather does not in itself injure roads no matter whether they are earth, gravel, or macadam. In fact, an earth road will stand more traffic when it is solidly frozen than at any other time. Excess water, however, it always detrimental to a highway. When cold weather turns this water into ice, the damage that it does is greatly increased. Ice occupies considerably more space than the water from which it is formed, and every person who has lived in a cold climate is familiar with the powerful bursting effect of water when left to freeze in a confined vessel. The same action takes place when a wet road freezes to any considerable depth. It simply bursts or, as we generally term it in road parlance, the road heaves. Later, when the frost leaves, the road is disintegrated and ruts badly. If this process is repeated a number of times during the winter, a gravel or macadam road may be practically destroyed, while an earth road may become entirely impassable.

A dry road will not heave. Rock, gravel, sand, and even clay when perfectly dry contract slightly on freezing. In order to expand on freezing, these materials must contain or be mixed with water, and the more water they contain the greater the expansion which takes place. But so long as the road remains frozen, the damage does not become apparent. Hence the frequent and erroneous idea that it is the thaw which injures the road. The injury was done when the water in the road froze and the particles of the road surface—broken stone, sand, or still finer particles of earth or clay—were pushed apart by the expending power of the freezing water. The thaw merely allows the ice to melt and assume its original volume as water.

The remedy is self evident. Keep the water out of the road. The time to begin preventive measures is early in the fall, before the rains begin. If the road goes into the winter thoroughly dry with the surface and drainage in good condition, the chances are extremely favorable that it will come out all right the following spring.

Keep the ditches and drains open. Remove all accumulations of weeds, grass, etc., which tend to retain moisture and obstruct drainage. Furthermore, do this work early, while the ground is still dry and hard. Vegetation and litter hold water like a sponge and allow it gradually to soak in and soften the earth. The job before the road man is to keep the hard dry surface formed in the summer time from becoming softened by the fall and winter rains and snows. When the fall rains begin the earth or gravel road should be dragged frequently to prevent the formation of ruts and the collection of water. All raveled places on macadam surfaces should be carefully filled in and consolidated.

# Crystalizing a Myth Says Campbell

## S. A. E. Learns How Tubes Are Made from Iron Ore

NEW YORK CITY, October 22—Recrystalization of metals due to fatigue is a myth, according to some startling statements made to the Society of Automobile Engineers, Metropolitan section, here last night. Recrystalization, commonly known as crystalizing, is supposed to be the reversion of close-grained metals to their pristine condition of coarse crystalline formation, such that they lose their strength.

Professor William Campbell of Columbia University gave an illustrated lecture on the difference between the chemical analysis method of determining the qualities of steel and the newer and rapidly-growing microscopic method. His talks were illustrated by lantern slides showing the aspect of metals under the microscope.

His statement regarding recrystalization was that the common theory in regard to the fatigue of metals due to vibration or other stresses was false and that the microscope shows that fractures attributed to this phenomenon are in reality nothing more than breaks caused by the development of a weak spot, due to the action of one granule upon another, and thereby breaking up the closely-knit structure necessary to strength.

C. F. Roland of the metallurgical department of the National Tube Co. gave a lecture, illustrating by motion pictures, on the manufacture of steel tubing, from the prospector's drill to the finished product.

### NO TRUCKS AT N. Y. SHOW

NEW YORK CITY, October 18—It became known here recently that no provisions have been made for motor truck representation at the New York show to be held at the Grand Central Palace, December 31 to January 8, next. There will be nineteen makers of motor trucks among the passenger car exhibitors, but no opportunity seems to have been provided for them to exhibit their commercial models, although in a few cases these concern's truck business exceeds in both number and value their passenger car business.

### EXCLUSIVE TRUCK SECTION AT BOSTON SHOW

BOSTON, MASS., October 16—Department C of the Fourteenth Annual Boston Automobile Show, to be held in the Mechanics' Building here, March 4 to 11, inclusive, 1916, will be devoted entirely to the exhibition of commercial vehicles. Boston is the only city with a show of more than local importance which continues truck exhibitions.

### TWELVE TRUCKS AT BINGHAMTON MOTOR SHOW

BINGHAMTON, N. Y., October 27—Twelve trucks will be shown at the annual motor exhibition of the Binghamton Automobile Dealers Assn., to be held at the State Armory, November 22 to 27, 1915.

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# New Gas-electric Tractor A Road Locomotive

## German Machine Operates on Multiple-unit Plan—Trailers Track Exactly

The 250-horsepower Muller gasoline-electric tractor

GERMAN preparedness and efficiency is exemplified in a new type of road train, now in use in the great war, comprising a 250-horsepower tractor operating a train of up to ten trailers by the multiple-unit system. This system is similar to that in use in electric trains, each unit being a complete electric truck, driving and braking on all four wheels and all four wheels steering, the power being electric, supplied from the tractor. The tractor is a huge electric generating plant with two separate 125-horsepower internal-combustion power plants, whose power, instead of being transmitted to the trailers by drawbar pull is parcelled out to each in the form of electric current to enable each to propel itself.

### Better Traction, Yet Lighter

This system has the advantage of increased traction and therefore the ability to negotiate more difficult going and also that of greatly lighter weight per axle than would be practicable with a road locomotive. The latter would have to be of such great weight to haul ten 5-ton trailers that it would not be possible to operate it over ordinary roads and bridges. The advantage of having the trailer units independent and interchangeable is in no way impaired.

### What They Built It For

This road train is being used extensively in the eastern theater of war by the German military authorities for the transportation of huge quantities of stores and ammunition from one point to another along the vast front of the battle zone. It was produced early in 1913 by Messrs. W. and Th. Muller, of Berlin-Steglitz, having been designed mainly and ostensibly for work in the German colonies and in other countries where colonial or semi-colonial conditions obtain.

As a matter of fact, one of these trains was sent to Australia some time about the beginning of 1914, where it achieved a certain amount of success. It is worth noting that from the first the experiments with this new model, which is of the gasoline-electric type, were closely followed by the German army officers responsible for transport affairs.

In the new outfit all the road wheels are driving wheels. All the vehicles have the same type of undercarriage, each set of wheels being supported on a sort of bogie, the coupling being of such a type as insures that each undercarriage follows the circuit taken by that immediately preceeding it.

The leading vehicle contains the power plant, which comprises two gasoline motors of 125 horsepower each, one at each end of the chassis frame, and a dynamo situated midway between the motors. In passing it might be noted that the outfit of the dynamos corresponds to that of the combined motors. In the driver's cab, which is located above the dynamo, all the controls are conveniently placed. Electric motors operate each set of road wheels, the position of each motor being immediately to the front of the undercarriage.

### Series-parallel Wiring

The method by which the current is distributed is interesting. The fields of all the motors are connected in series, but the armatures are connected in parallel. The fact that all controls are on a switchboard in the driver's cab on the power unit eliminates the neeessity for having anything in the shape of regulators or commutators on the following vehicles. Each motor carries at its rear the disk of an electro-magnetic brake.

There are the usual jackshafts, from which the road wheels are driven by chains. The brakes, which in earlier models acted on the inside of the chain wheels, have now been replaced by external brake shoes, acting directly on the circumference of the drums, and thereby enabling them to be examined and adjusted when necessary without any difficulty. The power unit generates sufficient energy to propel ten trailers, inclusive of itself, each vehicle having a load capacity of 5 tons; the train being capable of taking a load of 50 tons net.

The advantages of the self-contained gasoline motor are combined with those of the electric motor as a medium of power transmission, the wasteful gearset system being entirely eliminated.

Train of trailer chassis following in tracks of Muller tractor exactly. The tractor supplies electric current and guiding, each trailer being a complete electric truck, driving, steering and braking on all four wheels, the brakes electro-magnetically actuated

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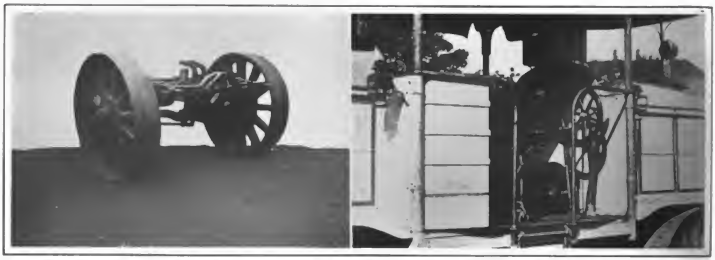

Details of Muller road train. Left, one of the trailer axle units, comprising an axle, springs and small frame with electric driving motor and electric brakes; right, a detailed view of the cab of the tractor. Note marine type of steering wheel, iron seat and conveniently-arranged instruments

# Our London Letter

## How British Dealers Quashed Proposed Duty on Made-in-America Motor Trucks

By R. Douglas-Vickers

LONDON, ENG., October 1—Since the Chancellor of the Exchequer has decided not to impose any duty on trucks, parts thereof, and tires imported into this country from abroad, realizing that they are very necessary for the commercial community which cannot at present get them at home, the situation in the motor trade—which has been very strained for the past 10 days or so—is now much easier. I have no doubt that manufacturers who after the introduction of the budget proposals received cables from importers here stopping further shipments have had instructions to resume.

### Not a Protective Tariff

A few days before the chancellor of the exchequer introduced his budget proposals, there were insistent indications in motor trade circles here that there would be a heavy import duty placed upon foreign manufactured motor vehicles. If the British manufacturers had had their wishes translated into the proposals of the chancellor, the amount of the duty would have been 45 per cent or even much more. That would undoubtedly have been a protective tariff, inasmuch as it would have prevented all but one or two concerns importing industrial chassis on the present price basis. As it happens, I do not consider the representations made to Mr. McKenna by the manufacturers had anything at all to do with his desire to impose a duty which, in Free Trade circles, was regarded as merely a sop to the tariff reformers in the coalition cabinet. The fact that a higher figure was not announced seems to bear out this view, with the result that a strong opposition to the proposed duties was growing amongst Free Traders purely on the general principle. As a revenue-raising device the possible return from it was not regarded as sufficiently great to justify any departure from our present fiscal system. It was held that if the chancellor's desire was to discourage the purchase of foreign passenger cars he could have insured this by increasing the inland tax or license duties.

In his speech the chancellor made no reference whatever to commercial vehicles, using the term motor cars, and there immediately arose a legitimate doubt as to whether or not he really intended to include trucks. The manufacturers believed he did. Many importers and most traders believed the contrary; but steps were promptly taken to clear up this point. A similar situation developed in regard to the increased duty on gasoline, which hitherto has been 6 cents per gallon when used for touring cars and 3 cents when used for commercial vehicles. The budget proposed an increase of 6 cents per gallon, which, if taken literally, would in effect treat the owner of trucks rather harshly in comparison with the passenger car owner. It is contended that the chancellor meant simply to double the existing duties, making it 12 cents in one case and 6 cents in the other.

### Dealers' Fight Won

Immediately after the proposals were made public the Motor Traders Assn. took steps to present its side of the case, which undoubtedly is very strong. They stated that British manufacturers could not by reason of their present engagements to the War Office and the Ministry of Munitions supply any vehicles, and if it had not been for the fact that they, the dealers, had been able to get agencies for American and other foreign machines their source of livelihood would have gone entirely, together with their good-will, which is as valuable to them as the factory owner's is to him. They pointed out further that the distributing trade involves an aggregate capital of $80,000,000, as against the $45,000,000 capital of the manufacturing concerns, whilst they find employment for 30,000 or 40,000 persons.

### Importers Are Confident

The attitude of the importers has, since the proposals were known, been calm, and so far as I can gather only a few of those handling American commercial vehicles cabled immediately, countermanding shipments. They believed that despite a duty there would still be a certain amount of business to be done, especially as the release of a small proportion of British-built trucks sanctioned by the War Department for delivery to government contractors and sub-contractors only touches the fringe of the demand. It was fully recognized that if a man wanted a commercial vehicle at all he needed it badly, and that the addition of one-third the invoiced price would not deter him from purchasing.

Large numbers of Peerless, Locomobile and other trucks continue to arrive for the government, although it was

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One of the bi-weekly convoys of Albion trucks for the war department, from the factory to headquarters. Photograph taken 36 miles from Carlisle, showing typical English rural scenery and excellent road surface

stated here some time ago that notices to terminate supplies had been issued. Several British concerns which had a standing order to deliver their regular weekly output to the War Department have had 6 weeks' notice to terminate this arrangement. It does not seem, however, that such firms will be allowed, at present at any rate, to produce for commercial delivery, as their works are more likely to be needed for the production of munitions.

### Australia's Waiting Market

Several letters which I have recently received from Australia indicate the great need that exists in that part of the world for commercial vehicles. Horse transport has become alarmingly expensive owing to the great rise in fodder prices, whilst there is great shortage of good draft animals.

The present seems to be an opportune time in this country for an active propaganda in favor of the electric vehicle, in view of the generally increased cost of operating gasoline motors. The new gasoline duty will increase the cost of working the heavier types of truck from $200 to $250 per annum, so that the supporters of the electric should find every reason to continue their pioneer efforts with renewed efforts. With the exception of the Baker and the G. V., no announcements of electric vehicle concerns appear to be before the public, which is very singular, considering the opportunity that now exists for starting their claims with advantage.

One of the possibilities of the present situation in Great Britain is that there will be an increase in the number of firms which will be engaged in the assembling of commercial vehicles from imported parts. One well-known concern, Henry Garner, Ltd., of Birmingham, has during the past 7 or 8 months delivered over 400 chassis erected from parts which he imported from your side of the water. For us this is quite a notable achievement and one that may before long find other imitators. The Ford concern at Manchester is, of course, the most notable example of this form of business, and I learn from them that it is something like 7,000 commercial orders behind, so great is the demand from the trading section of the community.

### Scotch Tractor Trials

A series of farm tractor trials were held in Scotland from October 4 to 6, and I learn from particulars which have reached me that at least four American-built machines took part. These are the Sandusky, Mogul, Bull, and Overtime. They all appear to be of a size and capacity quite suitable for this country, where mechanical methods of cultivation are on the increase. Larger areas of land are being plowed this fall than heretofore, and the 25-horsepower gasoline or kerosene tractor capable of handling a three-furrow plow will be in considerable demand.

### Horse Plowing Expensive

The cost of team plowing in this country works out at about $2.16 to $2.50 per acre, whereas the work can be done by a tractor such as I have indicated for less than $1 per acre. It might have been thought that agriculturists would have long ago adopted this form of traction more generally, but farmers are notoriously conservative in their outlook and unless driven to it by sheer necessity will not adopt modern methods.—R. Douglas-Vickers

One week's delivery of Halley 3½- and 6-ton trucks for the British war office. An example of an industrial community and the sort of roads encountered

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# U. S. Army Must Arrange for Truck Supply

## Motor Truck Club Learns That Commercial Types Surprised Regulars at Plattsburg Camp—The Motor Reserve Corps

MOTOR TRUCKS in military maneuvers have proven themselves indispensible, not only abroad, but in this country. Regular army officers were given a demonstration of the reliability, efficiency and superiority of motor trucks over the standard army mule at the Plattsburg encampment and the reports of the work of the fifteen motor vehicles which were attached to the forces there will go a long way toward establishing the motor truck as an essential part of modern military equipment.

Next to official recognition by army officers in importance is the provision of a reliable source of supply in the event of an emergency need by the army. The Motor Truck Club of America, an organization of motor truck owners, has taken up the subject of military preparedness along the lines of motor truck supply in case of need and with a view to determining to what extent present types of equipment are adapted to military service.

### Experience from Plattsburg

At the regular October meeting of the club, held Wednesday evening, October 20, in the rooms of the Automobile Club of America, in New York City, three experts who were identified with the motor transport section of the Plattsburg forces were guests at an informal dinner and gave the club the results of their experience with motor transport in quartermaster service. It will be remembered that the Plattsburg encampment was the first military event in this country in which motor transport was used on such an extensive scale as it was and that part of the motor squadron composed the first motor machine gun troop ever organized in the United States.

H. B. Clark, under a temporary camp commission of Lieutenant, acted as regimental quartermaster during the 4 weeks' encampment, and had entire command of the motor truck transport equipment. He discussed in detail the work which the trucks did under him, pointing out that at no time did the trucks fail to do all that they were asked to do in spite of the fact that he was assigned to jobs even more difficult than the regular mule-team equipment of the quartermasters' corps would have been given, and that positively no special concessions either as to route, loads or other particulars were made to the motor trucks.

No mechanical troubles of sufficient moment to require the attention of other than the driver-mechanics on the vehicles were encountered and every vehicle which arrived in camp on August 12 went through the entire training period.

### The Work of the Camp

The work consisted of moving the camp equipment, including kitchens, food, water, bedding, forage for the animals, tents and ammunition from the base at Plattsburg to some seven different camps as well as several bivouacs and from camp to camp as the troops marched. The trucks were required to make several trips each day with occasional runs back to the base for fresh supplies.

Besides full loads and often overloads, they were each required to carry from ten to a dozen men, and were not allowed to rest until each day's work was done, some of the camps being at some distance, as indicated by the name: Twenty-one-mile Camp given one of them.

Mr. Clark explained that he was not a mechanical expert, but was obliged to leave the mechanical supervision of the vehicles to their drivers and crews.

Bridges and culverts proved to be the Achilles' heels of the motor trains, and although not a civil engineer, Mr. Clark was obliged to contrive means to reinforce them as he went. Due to the discipline and efficient employment of the men assigned to him, Mr. Clark was able to make such reinforcements, often amounting to complete reconstruction with very little delay and without one failure.

There were 5,000 men at the Plattsburg encampment, of which 3,700 were regulars and 1,300 volunteers, made up of college students the first fortnight and of business men the second 2 weeks. All of the food for the entire camp was carried by the eight trucks under Mr. Clark's command. The camp equipment for the volunteer members of the camp was all carried by the trucks, leaving only the camp equipment for the regulars to the mule wagons.

### Mule Transport = Late Meals

The regulars frequently were served with late or cold meals and on many occasions were kept waiting for other accoutrements, but after the first day the volunteers always got their kitchen equipment before 9:00 a. m. while the mule equipment frequently was delayed until 5:00 p. m.

The mules averaged 2½ miles per hour, or about 20 miles maximum per day, while the trucks made from 50 to 80 miles per day.

Mr. Clark, from his experience made the startling statement that he regarded motor trucks as valuable not as auxiliaries to mule transport, but as substitutes, averring that it was possible for them to negotiate any going that was practicable for animal-drawn wagons and to do so with less delay and likelihood of failure.

On the trip up from New York City to Plattsburg, a run of 354 miles, two of the vehicles hauled 3-inch field guns with limbers and caissons. One of these arrived in Plattsburg, but the sighting mechanism, wheels and wheel boxes were found to have suffered severely from being hauled at speeds up to 35 miles per hour, so that the practice of towing standard artillery pieces was abondened thereafter. In the discussion of this point it was conceded that had the sighting mechanism been disconnected and carried by one of the men, and had the wheels and their boxes been supplied with high-speed bearings, it would be thoroughly practicable to transport them at these speeds.

### Army Officers Convinced

Mr. Clark stated that the prejudice against motor equipment which formerly existed in army circles was changed to enthusiasm when the instruction officers were daily shown the superiority of motor transport, and he declared that steps toward devising standard methods of employing motor trucks in the U. S. Army would shortly be prescribed. He said that there was nothing in the U. S. Army regulations or manuals to guide him in his work, but that from the reports made by the officers at the camp such would probably be speedily drawn up.

A. B. Cumner, service manager of the New York branch of the Autocar Co., Ardmore, Pa., which furnished seven Autocars to the transportation department, comprising all but one of the vehicles commanded by Mr. Clark, and A. F. Masury, chief engineer of the International Motor Co., which furnished the remaining one, a 3½-ton Mack, both agreed that for all-around work in the U. S. Army a truck not to exceed 2 tons in capacity was desirable.

They both stated that spare parts had been carried by each of the trucks, these being of minor sort except wheels. Pneumatic tires were used by some of the trucks to make the run to Plattsburg, but were replaced with solid-tire wheels when the work on the rough roads was encountered.

To add a touch of martial color to proceedings, it was arranged to have Lieutenant Gardiner of the Seventh Regiment, N. G. N. Y., present after the dinner to demonstrate two types of machine guns. The operation of both the belt and clip types was explained by the Lieutenant with the assistance of a sergeant, it being shown that the colorful news reports of a leaden hail, and of a sweeping, continuous rain of fire were greatly exaggerated and that machine gun firing was a matter of minutes at a time with long intervening intervals.

The discussion of military transport needs and experience was followed by an address by G. T. Bindbeutel, editor of

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*Motor Print*, read by the secretary in the absence of the speaker.

**The Motor Reserve Corps**

Mr. Bindbeutel presented the details of a movement for a motor reserve corps now being organized and revealed the fact that a number of public-spirited men of large means had subscribed to a fund of $60,000 for the organization of an armored motor gun fleet to be purchased and equipped before presentation to the National Guard of New York. Mr. Bindbeutel stated in part, as follows:

"We have not been seeking publicity, preferring to wait until the movement develops, therefore you have not heard much of the motor reserve corps in the newspapers, although the article by Secretary of War Garrison, which appeared in the October number of *Motor Print*, was widely quoted.

"I can tell you that the Automobile Reserve Corps is quietly going through formation in at least three states at this time, one of the states being New York.

"The Automobile Reserve Corps, which I will afterward refer to as the A. R. C., is conceived solely as a transport service, it having been proved in the European war that automobiles are not good for scouting duty. The Corps would aid in the mobilization of the militia each year and in the mobilization or concentration of National Guard or regular troops during times of actual war.

"There is no idea of developing an armored motor train in the Automobile Reserve Corps. In this connection I might say that New York State will have an armored motor train in the near future as a gift of several public-spirited millionaires who wish to keep their names secret. I have just received this information from Governor Whitman and I do not believe it has been made known before. This armored train will be a part of the New York National Guard and will be the first to be attached to any state body of militia.

"Governor Whitman, for a second time, has approved of the organization of a motor reserve corps in New York State and this means much not only in obtaining pledges of service from owners of motor cars and motor trucks, but in support of a bill that has to be put through the legislature creating the Automobile Reserve Corps as an adjunct of the National Guard.

"Major-General John F. O'Ryan, of course, approves of the A. R. C. and has delegated to Captain Lorillard Spencer the work of sketching out the organization of the corps for the state. In a recent conference with Captain Spencer, it was decided that the best plan for action in this state would be to call a mass meeting of motorists—including motor truck owners—to be held at one of the largest armories in the city at an early date.

"At this mass meeting prominent speakers will emphasize the need of preparedness in this country and appeal for motorists' support. A pledge of service of car and driver will be held up to all attending the mass meeting. All pledges obtained then and later will be attached to the A. R. C. bill on its way to the legislature and, upon the creation of the corps, a membership will be ready.

"I now have the pleasure of inviting the Motor Truck Club to name a speaker for this mass meeting, if it chooses to take favorable action. The National Security League will supply one speaker. The American Legion will not only furnish a speaker but hopes to name General Leonard Wood. The Automobile Club of America, having officially approved of the A. R. C., will also be asked to supply a representative. There probably will be a great attendance of motorists at this meeting and an effort will be made to have a company of the National Guard on hand to guard the cars of those attending the meeting.

"Many motorists have been sounded on this subject and we feel that there is sure to be a great patriotic response to the call for pledges. Members of the American Legion recently transported the Seventh Regiment to its mobilization at Van Cortlandt Park on about 4 days' notice. This is considered remarkable and leads Governor Whitman to comment: 'The practicability of transporting large bodies of troops by means of automobiles was demonstrated at the recent mobilization at Van Cortlandt Park, when the Seventh Regiment was moved from its armory to the mobilization rendezvous entirely by automobiles. An Automobile Reserve Corps would,' still using the Governor's words, 'in my opinion constitute a most valuable auxil-

(Continued on page 41)

# Midwest Section of Society of Automobile Engineers Formed

## Progress on Truck Standards Has Been Made

CHICAGO, October 15—A Chicago section was added to the family of the Society of Automobile Engineers at the time of the quarterly meeting of the Standards Committee held in Chicago yesterday. In fact, the formation of this section was one of the reasons that the committee held its meeting at Chicago, rather than at its Detroit headquarters. The temporary organization took place at a dinner held at the Chicago Automobile Club following the business session of the committee.

**Not Chicago Alone**

For some time it has been felt that the engineers on the west side of Lake Michigan should get together more often and a Chicago section has been talked of for more than a year. The name Midwest section was adopted, as it fits the territory better than would the name of the city, for it developed at the dinner that the section could draw upon over fifty S. A. E. members in Milwaukee alone, to say nothing of those in the other adjacent Wisconsin and Indiana automobile cities.

**Temporary Officers**

The work of the temporary organization will be carried through by William H. Van Dervoort, president of the S. A. E., as chairman; Marc A. Smith, Standard Oil Co., vice-chairman; Daniel Roesch, Armour Institute, treasurer, and Darwin S. Hatch, *Motor Age*, secretary. As soon as a charter has been granted by the council, the Mid-west section will complete its permanent organization. Indicating the decided interest which is being manifested in the new body was the attendance of 75 members at the organization dinner.

Among those who spoke in favor of the Midwestern section and who gave valuable suggestions to this newest member of the S. A. E. family, were David Beecroft, editor of THE COMMERCIAL VEHICLE; Karl Zimmerchied, General Motors Co.; Herbert L. Connell, Milwaukee Central Continuation School; George W. Dunnam and G. H. Connat, chairman and secretary, respectively, of the Detroit section S. A. E.; W. P. Kennedy, New York City; Prof. P. B. Woodworth, Stevens Institute, and Russell Huff, Packard Motor Car Co.

On the preceeding day several of the divisions of the Standards Committee held meetings which resulted in reports presented to the committee as a whole yesterday. The first report at the morning session was given by Mr. Zimmerchied and dealt with the work of the iron and steel division. This division has been one of the mainstays of the Standards Committee, and in the past year has been engaged in reconciling its early recommendations with the changes which have come about in the industry.

**Shaking Down Tire Sizes**

In the report of the Truck Standards committee, W. P. Kennedy said that his section had voted against the branding of solid tires with their equivalent millimeter dimensions. The section, however, is developing a table for the S. A. E. hand book which will give a conversion between the American and European sizes of tires. The addition of a 32-inch truck wheel has been suggested to the division for use on small, cheap cars, but as no special demand seems to have arisen for this size the committee men do not believe it is advisable to add it to the standard. In relation to industrial truck sizes, the division feels that due to the unsettled practice in this field, it is only warranted in recommending standards for wheel diameter, which are as follows: 10, 16, 20, 22, and 27 inches.

Another of the very complete reports submitted was that of the Spring division, which was presented by W. M. Newkirk in the absence of Chairman McKinley. This report dealt largely with notes on the basis of purchase and the chemical and physical tests to be given by buyers of springs. Sketches were submitted showing the proposed method of making tests upon the different classes of springs which will be presented to the society in January.

**Results of Optical Research**

Among the points of greatest interest that were made at the meeting of the Standards committee was the statement that a properly designed license plate with figures 3 inches high could be read as distinctly at the usual legal distance as the one with figures 6 inches high. Another was the recommendation by the same division that tail lights be placed centrally over the rear license number.

A startling announcement was that by the electrical equipment division that there were no dimming devices on the market that could be recommended by the S. A. E. The committee adopted a uniform location and size for distinguishing marks on the chassis and motors which will be a benefit in the prevention and apprehension of theft of cars. As to the strictly technical work effected by the committee meeting there was a great deal of value to the engineers of motor car plant and part makers which also is indirectly valuable to owners as well, such as the standardization of wire sizes, tire pump basis, clutch housings and other features of design which make for uniformity and accessibility of the product.

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# Boston Tech. Fixes Fields of Motor Trucks

## Results of 3 Years' Study Show That Electric and Gasoline Trucks Can Cover Entire Range of City Hauling

CULMINATING 3 years of disinterested study under the auspices of one of the foremost technical colleges in the United States, Harry F. Thompson has made a final report on the work conducted under his supervision by the Electrical Engineering Research Bureau of the Massachusetts Institute of Technology, Boston, Mass.

The report has just been published by the institute in Vehicle Research Bulletin No. 4, containing 62 pages of text, charts and tables. It comprises a summary of a study begun in the spring of 1911 and conducted without interruption until early in 1914. Three reports on progress were previously issued and Mr. Thompson has on several occasions presented papers on the study before various electric vehicle meetings.

### Data Mainly Tabulated

The pith of the conclusions reached by Mr. Thompson are contained in the "Suggestions Regarding Motor Truck Operation" contained in the boxed insert on this page. The report goes briefly but thoroughly into the fundamentals of motor truck operation, and while much of the matter presented is quite elemental, it has been considered necessary as a sound premise for conclusions drawn. The report is divided into three parts, Part I being devoted to a discussion of city hauling conditions; Part II to data upon cost and performance, and Part III to comparative estimates. The appendix comprises ten tables, these containing the bulk of the data collected.

In Part I, the importance of standing time is emphasized; methods and value of supervision of vehicles and an exposition of the use and utility of recording devices are given; the moving factor is explained and applied to practical study; methods of reducing standing time and speeding up drivers are explained; freight delay at warehouses with the effect of underloading are analyzed; a record system for motor trucks is described, and the suggestions regarding motor truck operation reproduced on this page are given.

In Part II, performance study, its value and examples are given; seasonal variations in performance are shown; the collection of cost data is described and its methods explained; and both gasoline and electric truck and horse-wagon costs are analyzed.

Part III gives estimates for parcel delivery, bulk-goods delivery and freight handling; discourses on the relation of energy, that is, power, to labor, and a conclusion drawn from the whole study.

### Suggestions Regarding Motor Truck Operation

**1—The work of a vehicle should be routed with a view to avoiding idle standing time and unnecessary retracing of route.**

**2—Every reasonable effort should be made to keep a motor truck moving; in operating a mixed system of horses and motors, it should be remembered that a motor represents both more investment and more earning power than a horse wagon.**

**3—The mechanism of a truck should be carefully inspected at least once in 2 weeks, and a written report thereon be made to the superintendent.**

**4—A vehicle should be entirely overhauled at least once each year, in order that worn parts may be located and replaced.**

**5—All abuse of a truck, especially overspeeding and overloading, should be prohibited.**

**6—The interest of a driver in the condition of his vehicle should be promoted, as the truck is furnished by the company to assist him in performing his work; so far as possible a certain machine should be assigned to each driver.**

**7—An accurate record should be kept of the cost items and performance for each vehicle; this will assist in arranging the work of a truck, it will stimulate the driver to his best effort, and it will be valuable in any discussion with the manufacturers of the machine or its equipment.**

### Conclusions From Study

The conclusions reached by Mr. Thompson include the following:

ECONOMIC ZONES OF OPERATION

"For the purpose of defining the relative economic fields of horse, electric, and gasoline trucks, the territory covered by all kinds of trucking service may be divided into three general zones:

"1—The short-haul zone covering dense territory, which requires only short runs for each vehicle per day, the limits of this territory depending on local conditions and on the individual circumstances of any given case;

"2—The medium-haul zone covering that territory, outside of the short-haul zone, within which the daily mileage required by the service does not exceed that which an electric machine can conveniently travel on a single battery charge; and

"3—The long-haul zone covering the territory to be served which lies beyond the limits of the medium-haul zone.

### Economy on Short Hauls

"The investigation has shown that, under the conditions observed, for both light and heavy service, the electric truck can operate within the short-haul zone at approximately the same unit delivery cost as can the horse wagon, and at a considerably lower unit delivery cost than can the gasoline truck of a similar grade of equipment. For territory requiring longer runs, but within the medium-haul zone, the electric truck can operate at a lower unit delivery cost than either the gasoline truck or the horse wagon. For service in territory which calls for runs of each vehicle which are beyond the convenient daily mileage capacity of a storage battery, the gasoline truck is the most economical of the three types, except as noted in the section on 'Possible Methods for Increasing Economic Zone for Electric Trucks,' below.

"Definite numerical figures for the limits of the above three zones are of little general value unless based on averages obtained from a large number of observations, and any figures for individual cases are likely to differ widely from the average figures. In this investigation it appears that, under the conditions considered, the short-haul zone is approximately within a 2-mile radius from the center of operation, whereas the medium-haul zone includes the territory beyond the short-haul zone, but within an outer radius ranging approximately from 6 to 10 miles, corresponding to a daily mileage of approximately 30 to 45 miles. Representative values of the difference in delivery costs in favor of the electric over the gasoline machine in the medium-haul zone, under the conditions covered by the investigation, range from 8 to 20 per cent, and values of the difference over the horse wagon are as high as 30 per cent. While, in certain classes of service within this zone, the horse is entirely eliminated because of its physical limitations.

POSSIBLE IMPROVEMENTS OF CONDITIONS OF OPERATION

"The above comparison refers to conditions as observed in the progress of the investigation. As data have been collected from a large number of cities throughout the eastern part of the country, it is felt that the conclusions apply to typical present conditions. It has been pointed out in the discussion that under present conditions motor trucks do not, in general, realize the full extent of their possible economies, because of restrictions imposed by continuing so-called horse-wagon methods of operation in the use of motor trucks. Improvements in the conditions sur-

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rounding the operation of trucking and delivery equipment, whereby the standing time is reduced, would result in a greater proportional reduction in the expense of motor-truck delivery than in the expense of horse-wagon delivery. Thus, whereas the study has shown that for very short-haul service there is at present little difference in the unit costs for delivering by horse wagon and by electric truck, the improvement in conditions surrounding such service which may be expected with the continued introduction of motor trucks, as well as the development of the design of motor-truck equipment to suit it more adequately for the short-haul work, should shortly enable the electric truck to perform even short-haul service at a considerably lower unit delivery cost than can the horse wagon.

"In the case of a large company whose operations include short, medium, and long hauls, the greatest economy would probably be obtained by standardizing upon motor equipment rather than operating a mixed service of horses and motors; the choice of motor equipment for best economy in each class of service would in general be determined with reference to the outer radius of each particular delivery zone, in accordance with the conclusions stated above under 'Economic Zones of Operation.'"

### POSSIBLE METHODS FOR INCREASING ECONOMIC ZONE FOR ELECTRIC TRUCKS

"The field of economic operation of the electric truck in various classes of service may be extended in certain ways. This may be accomplished if economic facilities for recharging — boosting — are available at desirable points and such boosting can be performed without serious loss of time. Also, additional range of operation for the electric truck may be obtained by the use of a second set of batteries to replace a nearly discharged set, for a truck which is to cover on its daily route a mileage greater than that limited at present by a single battery charge. Therefore, ready facilities for boosting or for the exchange of batteries may serve as a means for increasing the radius of the zone in which the unit delivery cost for the electric machine is lower than that for the gasoline machine.

### COST VS. OTHER FACTORS DETERMINING CHOICE OF EQUIPMENT

"It should be noted that this discussion has been based upon the relative costs of delivery by the three types of vehicles. In a great many instances the cost is not the only important criterion which determines the operator's selection of delivery equipment. Such features as reliability, appearance, rapidity of deliveries, advertising value of a certain type of equipment or motive power, cleanliness, etc., cannot be assigned values in dollars and cents in a general analysis. Thus, although a cost analysis may show little difference between motors and horses for very short-haul work, these other features, together with the prospect for improvement which may be obtained by reorganizing the service to adapt it to motor-truck operation, may warrant the adoption of motors; for longer-haul work, where the motors show a distinct advantage over hourses in point of unit cost, there appears to be little question of the economic superiority of the motors. In any individual case, a satisfactory comparison can be made only by taking into account all of the contributing conditions.

"Insofar as the general public is concerned, the unhygienic conditions accompanying the presence of horses is a factor which deserves consideration, especially in the congested districts of large cities. Not only do horses cause a large portion of the filth on our streets, but they are also largely responsible for the presence of flies and the spread of disease caused thereby. It is conceivable that the use of horses in certain districts may some day be prohibited by legislation, in the same way that the production of smoke is restricted in some cities.

### PROSPECT FOR THE FUTURE

"It may also be remarked that the use of horses and wagons, after their many generations of application, has reached a highly developed state, whereas, in the case of motor trucks, both electric and gasoline, the habits of many users have not adjusted themselves to the most efficient application of the machines, as the experience in the operation of motor trucks, in a large number of instances, is comparatively new. The combined improvements in the details of construction and in the conditions surrounding their operation will probably result in the motors showing an increasing superiority over horse wagons in all respects."

# Field and Future of Gasoline Farm Tractors

## Farm Greatest Power Consumer—Animal Limits Reached

FARM POWER, exceeding in extent and cost that for any other purpose, even manufacturing in all branches is today the only great field of power consumption which depends upon animal power in the main. Phillip S. Rose, editor, *The American Thresherman* and the *Gas Review*, Madison, Wisconsin, in an address delivered before the International Engineering Congress at San Francisco last September, made the prediction that this giant among power-consuming industries would also adopt mechanical power for the greater part, and that soon.

Mr. Rose points out that the preferred use of horse and mule power by American farmers, in spite of its greater cost per unit of energy, is due to the greater "activity" or versatility of the animal as against the engine. He further states that the 24,042,882 horses on farms in 1910 have grown to 25,411,000 up to January 1, 1915, by estimates of the Department of Agriculture, of which 20,328,800 are mature work animals.

### 14,230,000 Horsepower on Farms

Each horse develops 7/10 horsepower, so that the animal power on farms is estimated by Mr. Rose to aggregate 14,230,000 horsepower. The value of these horses is $2,842,655,000 and their harness, $203,200,000, a total of $3,045,855,000, or $214.05 per horsepower. He quotes Prof. Gebhart of Armour Institute, Chicago, to show that steam power plants cost $200 to $175, the cost varying inversely as the power of the plant.

### Horse Effectiveness Declines

The number of farm horses has increased from about 7,000,000 in 1870 to about 21,000,000 in 1914, and the acreage worked has increased from 185,000,000 in 1870 to 500,000,000 in 1914, so that though the increase in power available and work to be done has kept approximate step, the actual acreage worked per horse has decreased from 20.3 in 1870 to about 19.2 since 1900.

This greater power expended per acre is explained by two things, namely, deeper plowing and scarcity and rising cost of farm labor. The draft on a plow in ordinary soil increases about in proportion with the depth of the furrow in inches, so that deeper plowing, which all authorities indorse, requires more power. The scarcity and dearness of farm labor has given rise to heavier machines, such as gang plows, combined harrows and grain drills, larger harvesters, etc., so that each unit of labor is able to compass a greater amount of work per day or so that each farm requires a fewer number of hands.

This has led to the breeding of heavier and heavier draft animals for the farm, until the limit has about been reached. Further development along the above lines requires that the horse with his limitations be discarded and the limitless power of the internal combustion engine employed in his stead. Concerning this, Mr. Rose says:

### Farm Tractor's Status

"Available mechanical farm power consists of steam engines, internal combustion engines, wind mills and water power. Electric power, generated either by steam plants or hydro-electric stations, is used to a limited extent in some favored localities, as along the Pacific seaboard, in Montana and in some of the central states, but, as yet, it has not come into serious competition with any of the other powers.

"Small water-power plants are available in only a few favored localities, and then the cost of the dam and power equipment is exceedingly high, so this kind of power may be left out of general consideration.

"The use of windmills has been on the decline for a number of years. The principal objection to their use is the smallness of the power units and the uncertainty of obtaining power when needed.

"This, then, leaves only two sources of power for serious consideration, namely the steam, gas or oil engine. The former has been in use in this country since about the year 1830. Steam did not come into very extensive use until after the Civil War, and then only for operating threshing machines, running small saw-mills and for grinding feed. Experiments were made in this country, along in the Seventies and Eighties of the last century, with steam plowing outfits but

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not with much success, either because the engines were not designed rigidly enough, or because the country was too poor to invest in such costly machines. Probably both causes had an influence on the situation.

"About the year 1898, however, when the western prairies were being opened up so rapidly, a demand arose for heavy power outfits to break up the virgin sod and within the next 5 years a number of excellent steam rigs were put on the market. Practically every threshing outfit sold throughout the west in the early Nineties was sold not only for threshing but for plowing also. Thousands of acres were broken by these rigs, but their great weight and the difficulty of getting water to them on the dry western plains created a demand for something different and better.

"It was these conditions, together with the rising price of horses, that paved the way for the gas tractor. The first of these machines came out about the year 1900, but it was not until 6 years later that they became practical machines. Two companies divide the honor of being the pioneers in this new industry, the Hart-Parr Co., of Charles City, Ia., and the Kinnard-Haines Co., Minneapolis, Minn. The success of these machines brought into the field a host of competitors among the old threshing machine manufacturers, and by 1912 the tractor industry had grown to considerable proportions. That was the banner year. It was freely predicted by many enthusiasts that the horse was doomed and that in a very short time all farm work would be done with tractors. They practically crowded the steam plowing outfits off the market and thousands of farmers bought them.

### Gas Tractor Failures

"A considerable number succeeded with the tractor, but a larger number failed. In some cases, the cause of failure was due to the failure of the machine, but in the majority of cases it was due either to the ignorance of the operator or to the fact that his style of farming was not adapted to power machinery. It was also found that the heavy outfits that were used to break up the prairies were not adapted to general field work, and so the industry has suffered a partial collapse during the last two years. Another factor that contributed to the general failure of business was the faulty methods employed by most of the companies in doing business. The market was not well sold. Farmers were induced to buy, who could not possibly make a success with a tractor, and there was not enough care given to the instructions of the operators. The tractor has suffered in comparison with the passenger motor vehicle because the latter has had the help of countless garages to help keep them in good working order. The tractor, on the other hand, has had to get along generally without any expert attention. Invariably, those who have made a success have been good mechanics. In fact, failures among mechanics or those of fair mechanical ability have been rare.

"At the present time there is a decided revival in the use of the light-weight tractor that sells for a few hundred dollars and will take the place of a half dozen horses. There are perhaps fifty companies that will bring out a light-weight tractor this spring in response to a demand by the farmers of the corn belt and wheat belts. This demand is not one that has been worked up by ingenious and persistent advertising but comes from the farmers themselves, who realize the limitations of animal power and who desire to do a better grade of farming than they have done in the past. Just how the light-weight tractor will develop is difficult to forecast at this time, but where such a genuine need exists there seems little doubt that the manufacturers who have had a number of years' experience will be able to produce a machine that will be able to supplement the horse and the mule, even if it does not displace them. The present tendency toward very light machines, weighing only 3,000 or 4,000 pounds, probably marks the extreme swing of the pendulum toward light weight. The tractor that appears, to the writer, to have the best chance for ultimate success will weigh from 6,000 to 8,000 pounds and have about a 30-horsepower motor.

"A careful canvass of the states west of the Mississippi made last winter by A. P. Yerkes, a government agent connected with the Bureau of Farm Management of the United States Department of Agriculture, shows that there are something like 13,000 tractors in operation. There are probably not to exceed one-quarter as many east of the river, making something less than 20,000 tractors in use in the entire country. These tractors vary greatly in size, but will doubtless average close to 40 brake horsepower each.

"The possibilities for the use of tractors are, however, almost unlimited when the number of farms of large size containing 175 acres or more, is considered. Each one of these farms would appear to be large enough to make profitable use of some form of mechanical power for general farm use, provided one can be built and sold for a price at which the farmer can afford to make the investment.

"Steam traction engines are still used as the principal source of power for threshing, and it does not seem likely that they will be displaced entirely for a great many years. From the best information available, which, by the way, the writer has checked over in several ways, it is estimated that there are a total of close to 100,000 steam tractors in this country used for threshing and other agricultural work. The average brake horsepower of these machines is probably about 40. Quite a large number are used for plowing, for filling silos, grading roads, grinding feed, shredding and husking corn and for operating small portable saw-mills.

"There is still left the passenger car and the farm truck to consider. The latter is used very little, but of the former the number is very large, running into hundreds of thousands. In the state of Iowa alone it is estimated that there are 65,000 passenger cars owned by farmers, and a number of other states are not much behind. Since these are primarily passenger machines rather than farm power machines, I shall not spend much time with their consideration. Suffice it merely to say that they are finding a rapidly increasing use in marketing light farm produce and paving the way for better roads and for the use of trucks.

### 23,905,000 Horsepower on Farms

"The total power used in all manufacturing enterprises, according to the 1910 census, was 18,755,286 horsepower. Even allowing a large margin for possible error, it is thus seen that the farmer's power problem is a big one and involves millions of dollars. Mechanical power, as yet, is much smaller in amount than animal power, but it is rapidly increasing and within a few years will doubtless assume first place."

"I said in the beginning that farm power exceeds in value and amount that it used in all manufacturing industries. The proof has been submitted, but to make it more apparent let us tabulate the results:

| Kind of Power | Number | Average Value | Total Value | Total Power |
|---|---|---|---|---|
| Horses and mules | 25,411,000 | $111.85 | $2,842,655,000 | 14,230,000 |
| Harnesses | 20,382,000 | 10.00 | 203,820,000 | ..... |
| Windmills | 750,000 | 100.00 | 75,000,000 | 75,000 |
| Steam tractors | 100,000 | ..... | ..... | 4,000,000 |
| Gas tractors | 20,000 | 2,000.00 | 40,000,000 | 600,000 |
| Gas engines | 1,000,000 | 150.00 | 150,000,000 | 5,000,000 |
| Grand Totals | | | $3,311,475,000 | 23,905,000 |

# Effect of Speed on Truck Tires

## WHY DETACHED GOVERNORS DETERIORATE RUBBER

"Running truck tires at excessive speeds is a common fault among truck drivers," says R. S. Wilson, manager of the service department of the Goodyear Tire & Rubber Co., Akron, O.

"The effect is the same as running them over rough roads, for speeding magnifies every irregularity. The tires will absorb the shocks when the truck is operated at the recommended rate of speed, but increasing the speed greatly increases the force of the shocks. For instance, doubling the speed makes the force of these shocks four times as great.

"When you consider the shocks a truck tire must absorb when driven carefully you can understand how the tire is taxed beyond its limit of the power to absorb when driven at excessive speed.

"There is no form of truck tire abuse which is more expensive than speeding. If a man set out to ruin a set of truck tires he could not find a quicker way than to run the truck, heavily loaded, at excessive speed. This is a sure way to destroy tires, and yet we see it almost daily.

"In the first place, there is the danger that the centrifugal force in the swiftly-moving tire will tear the soft rubber from its base and generate a heat that will cause the rubber to deteriorate. No matter how great the cushioning qualities of the rubber, the tire does not have time to accommodate itself to the rough surface of the road, and the destructive jolting caused will be very costly. An expensive truck can very soon be jarred out of commission by speeding.

"It is surprising how the mileage of a truck tire can be increased through a little care, and it is inevitable that it must deteriorate rapidly if abused through excessive speeding."

The explanation of the destructive effect of speed is that the shock to the tire increases as the square of the speed—by geometrical progression rather than arithmetical. Some drivers think that a tire which will carry its load without trouble at one speed should do the same at a higher speed, but this is entirely wrong, as to double the speed will quadruple the tire wear.

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To the left, a novel truck-and-trailer unit used by the Fisher Body Co., Detroit, for the delivery of its motor vehicle bodies to the plants of the car manufacturers. Directly below is a special Peerless tractor designed to carry a certain amount of the load and to haul the rest in trailers. The trailers shown are Troys

## The Field of the Trailer

(Continued from page 9)

it was new so far as motor trucks were concerned.

This acceptance of the trailer principle has now spread all over the country and thousands of truck owners are now reaping the benefits of trailer economy. While it is impossible to determine the exact number of trailers now in use with motor trucks or tractors in the United States, because they are not registered in all states, it is perhaps safe to state that they number close to 10,000. Detroit is perhaps the foremost trailer city in the country, with approximately 2,000 trailers of all kinds in use. The great majority of these are of the light two-wheeled type, the most of which are of home-made variety. The reasons for this are that Detroit is an ideal city for trailer use because practically all of its street grades are less than 4 per cent; also because it is the heart of the motor vehicle industry and because its owners of trucks appear to have been more progressive and put the trailer principle into active operation generally while other sections were thinking about it. Cleveland also has close to 2,000 trailers of all kinds in use. The number of trailers in use in New York City and other eastern cities is also increasing fast, as is also the case in Chicago and other western and west coast cities, especially Los Angeles.

### A Few Cases of Trailer Economy

Many interesting uses of motor truck trailers for hauling heavy loads which with horses would have required such a large number that traffic would have had to be suspended, have been described and pictured in THE COMMERCIAL VEHICLE from time to time. Many of these are shown in the accompanying illustrations. But of more importance to the average truck owner are those cases where trucks alone did not prove entirely satisfactory but by the use of trailers were made more efficient and enabled a large economy to be effected.

Among the many examples of this sort are those of the Saxon Motor Co., the Studebaker Corp., Hammond Standish & Co., meat packers; W. H. Edgar & Sons, the Ford Motor Co., and the Kastner Coal & Cartage Co., all of Detroit and all using Troy trailers. The Motor Truck & Terminal Co., and M. A. Newmark & Co., Los Angeles, are also using Troy trailers and effecting large economies thereby.

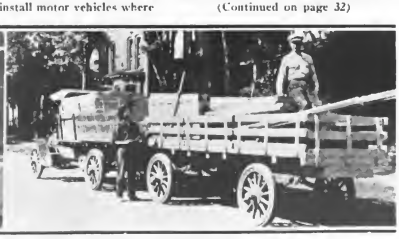
The Detroit City Gas Co., the Pfeiffer Brewing Co., the Kling Brewing Co., and the City of Detroit, Department of Public Works, are all using Detroit trailers with economy.

In New York City, Borden's Condensed Milk Co. has a trailer installation which has received international attention. The Municipal Asphalt Plant, using Watson bottom-dump trailers, has been able to install motor vehicles where they had never been used before with success. Thomas Roulston, a large grocer in Brooklyn, N. Y., has eliminated the idle loading time of his trucks, usually 2 hours per load, by the use of several steel-tired Shadbolt semi-trailers. Of course, the examples enumerated above are but a few of the great many which lack of space forbids giving. Some of the examples are pictured herewith.

### Objections Against Trailers

Since the more extensive use of trailers there has been a certain amount of adverse legislation against their use. In the cities this has taken the form of prohibitions against a greater weight per wheel than the roads now built for light traffic would stand and against the use of more than one trailer on crowded thoroughfares. In the country or the suburbs of the cities, the weight limitation has been due to existence of bridges and culverts built for the horse buggy days. It has also been the practice of recent legislatures in various states to tax any vehicle carrying heavy weights out of all proportion to other vehicles because of the mistaken idea that road damage is due exclusively to the weight carried. Speed is also an important consideration and because the heavy-capacity

(Continued on page 32)



At the left, C. H. Martin's patent fifth-wheel for motor truck semi-trailers, showing it applied to a conventional horse wagon and the short-turning radius of the unit. At the right, a 3-ton four-wheeled Detroit trailer used for handling building trim in Detroit

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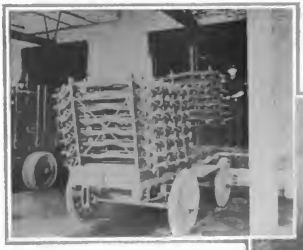
# TRAILER

## Loading Delays Eliminated by Proper Use of Trailers

Above, a 5-ton Troy reversible trailer and 5-ton Sampson truck owned by W. H. Edgar & Sons, Detroit, delivering rolls of paper to the *Detroit Journal*. In the view shown above the truck carried nine rolls of paper weighing 6.3 tons and the trailer eighteen rolls of the same weight, making a total load delivered of 12.6 tons. By this method the truck has to make but one trip per day, whereas without the trailer it had to make two



Above, a 2½-ton Troy trailer owned by the Cadillac Motor Car Co., Detroit, shown at the loading door of the Timken-Detroit Axle Co., and used to carry axles from the fatter's plant to the former's. About $5,000 was spent by the Timken company in changing the layout of its loading bay so that the trailer could be used, but the economy effected has more than offset the cost of remodeling

Right, one of the new G. V. gas-electric tractors with novel garbage trailer used in New York City

Above, some of the converted horse-wagon semi-trailers used by the Cranford Co., Brooklyn, N. Y., contractors, shown lined up under the steel bent used to couple and uncouple them quickly from the Garford tractors by differential blocks

Below, a 2½-ton Troy trailer spotted at the plant of the General Aluminum & Brass Co., Detroit, all loaded and waiting the return of the truck from another run. It is loaded with crankcases of twelve-cylinder motors for the Packard company

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# VERSATILITY

## Trailers of All Types Solving Difficult Truck Problems

Above, one of two Troy trailers now used by the Ford Motor Co., Detroit, in connection with one Kelly truck on day-shift work. Two Kelly trucks of the same size were formerly used day and night to accomplish the same work. As Ford drivers and helpers are paid $5 daily, this move saved $20 daily in labor alone

Directly above, a Knox three-wheeler used with monster steel semi-trailer for garbage and ash haulage in Brooklyn, N. Y.

To the left, Plant No. 1 of the Studebaker Corp., Detroit, showing how 3-ton Peerless and 5-ton Troy trailer are loaded with axles and clutch assemblies in units of seven on wood stands. It takes 20 minutes to load truck and trailer with 9.3 tons. Loads are carried both ways, forgings being brought back from plant 3. Fifty-six axle units in the truck and trailer load. The truck alone used to carry twelve before the trailer and stands were used

Above, a 1½-ton Troy trailer used by the Detroit Post Office to carry mail between the main office and the railroad stations. It is loaded while the truck which pulls it is busy on other routes

Above, the loaded trailer leaving the railroad station for the main post office. If trains are late the trailer is held, but not the truck

To the left, a Knox semi-trailer unit on its snow shoes in Springfield, Mass.

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## The Field of the Trailer

(Continued from page 29)

vehicle has less speed than the lighter types it has somewhat of a roller effect on the road, because the trailer wheels are of sufficient width to distribute the load so that the unit pressure per square inch is the same for both heavy and light vehicles. This opposition to trailers is slowly passing away, because the trailer principle is fast becoming universally known, due to the large number in use. Trains of trailers are permissible in the outskirts of most all of the large cities while in the city limits the laws prohibit the use of more than one trailer at a time because of traffic.

### Objections of Truck Makers

Like the former opposition to the use of trailers because they carried heavy loads and because they damaged light bridges and culverts and roads built only for horse use, there also was opposition to the use of trailers by a large majority of the motor truck manufacturers, who claimed that hauling trailers damaged the trucks and made their lease of life much shorter. With the diffusion of the trailer principle during the past year or so, much of this opposition has been withdrawn with the exception of a small number of manufacturers of worm-driven vehicles. The opposition in this quarter is due to the fact that the efficiency of the worm is not at its highest in low-gear work and trailer use requires mainly low-gear running by the tractor. The use of trucks with this type of drive in connection with trailers meant that they could not negotiate hills with large grades as easily as those with other types of drives. In this connection it is significant to note that one of the large grocery concerns operating in the New York City territory is using several worm-driven trucks as tractors which are giving entire satisfaction.

In this connection, however, it may be fairly stated that several of the manufacturers of conventional trucks who guarantee their vehicles for use in conjunction with one or more trailers, have made slight changes in their trucks which would not have been made were it not for the possibility of trailer use. These changes are generally slight and do not affect the truck design appreciably. They consist of changing the final gear ratio between the motor and the rear wheels so as to produce more power at slow speed; the fitting of radiators of slightly larger cooling capacity to take care of the continued low-gear work during the hot summer months; the strengthening of that portion of the frame or frame members not intended to withstand such stresses; the fitting of heavier propulsive members; the use of more powerful brakes and the fitting of one size larger tires than usual on the driving wheels.

All of these changes, while slight, have been made in several instances where the extensive use of the trucks or tractors has been anticipated.

It would seem that an ideal truck to be used both as a tractor and as an independent vehicle should have four speeds, the direct drive being, perhaps, on third speed, between the normal and the third speeds in gear ratio, with the fourth speed geared up to the same ratio as the third speed of the normal three-speed gearbox.

The standard truck of today has sufficient power to draw over good roads considerably more than it can carry and the driving mechanism to the rear wheels is sufficient to handle all the power which the motor can develop so that the use of trailers consists simply of utilizing the truck's latent drawbar pull.

### Drawbar Pull One-Half Truck Capacity

Tests have proven that a fully-loaded motor truck will develop a drawbar pull equal to about one-half of its rated capacity. Further tests have shown that it requires approximately 250 pounds of drawbar pull to haul 1 ton of live load on a properly-constructed road on a trailer under ordinary conditions of speed, road surface and slight grades. The type and condition of the road surface will naturally decrease or increase this average, depending on whether they are good or bad. The table of road resistances in pounds per pound given on page 5 will aid a motor truck owner in determining the ratio corresponding to the given road condition. This ratio added to the gradient ratio and multiplied by the total weight of trailer and its load will give the drawbar pull necessary to haul it at speeds not in excess of 12 miles per hour. The other table given on page 5 shows the increase of truck capacity by the use of trailers calculated at the rate of 250 pounds of drawbar pull per ton of live load hauled.

### Trailer Future Assured

The future of the motor truck trailer is assured from the economical results so far obtained from those already in use. Whether a truck owner should use a two-wheeled semi-trailer, a four-

(Continued on page 38)

## Putting the Truck Fender Through Its Paces

Photographs of tests of American truck fender on St. Nicholas avenue, New York City, made by the Safety-First Society of New York City on October 12 last and witnessed by observers

Above the fender is shown attached to one of the 3-ton Atlantic electric trucks of the Anheuser-Busch Brewing Assn., in the normal or carrying position. In the bottom view it is shown striking a dummy a glancing blow, demonstrating its ability to prevent a person struck down from getting under the wheels

The above view shows the fender picking up the dummy in a prone position. The fender is dropped by pressing a pedal, so that it is inoperative unless the driver sees the danger in time to press his foot down. In this case he would likely have time to stop the truck. In a real emergency he would not have time to drop it

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## Electric Vehicles in Municipal Service

(Continued from page 15)

operated on two shifts with different types of trailers and the saving over present methods will be substantial. While the conditions in the district in question and in other districts to which the system may later be extended led to the adoption of gas-electric tractors, it is highly probable that in many municipalities the storage battery electric would prove to be the solution, especially with a battery interchange system.

As comparing the relative economy of electric and gasoline operation on transfer work, the following data has been obtained from the New York Street Cleaning Department on a 5-ton electric tractor and a 5-ton gasoline tractor, and estimates of operating costs of both machines have been made, based on this information:

**5-Ton Electric Tractor, and 5-Ton Gasoline Tractor, Department of Street Cleaning, City of New York**

The electric operates from stable at Flushing and Kent avenues, Brooklyn, to Utica avenue and Pacific street, Brooklyn. Round trip, 7 miles; time, 1 hour 10 minutes. Pulls trailer carrying from 14,400 pounds to 18,800 pounds. Repairs to electric tractor since beginning of operation, none. Renewals only on tires. Trailer has had several minor repairs. Makes five trips per day. Load equals six to eight carts. Gasoline tractor from same stable makes trip with same load in 1 hour 5 minutes. Breaks down frequently. Below is an estimated comparison of operating figure.

**Electric**

| | |
|---|---|
| Depreciation at 10 per cent | $450.00 |
| Interest at 6 per cent | 270.00 |
| Battery renewals and repairs | 399.00 |
| Mechanical parts upkeep | 189.00 |
| Tire renewals and repairs | 336.00 |
| Electricity at 0.05 per kw.-hr. | 543.00 |
| Oil, water, etc. | 40.00 |
| Total cost per year | $2,227.00 |
| Total mileage annually | 10,500.0 |
| Cost per ton-mile | $0.0565 |

**Gasoline**

| | |
|---|---|
| Depreciation at 20 per cent | $960.00 |
| Interest at 6 per cent | 288.00 |
| Maintenance | 420.00 |
| Tires | 656.25 |
| Gasoline | 471.00 |
| Oil and grease | 131.25 |
| Total cost per year | $2,926.50 |
| Total mileage annually | 10,500.0 |
| Cost per ton-mile | $0.0743 |

A saving of approximately 40 per cent per ton-mile.

It was the sentiment that the paper outlines the beginning of what may be a large business for the electric makers. Undoubtedly the street cleaning apparatus is a brand new field. The central station could aid in the placing of municipal vehicles due to its influence in these quarters.

Mr. Baker, of the Baker R. & L. Co., stated that the use of electric vehicles for public service purposes is one of the greatest fields and best ways of bringing electrics before the public, which sees them go by always working. If the central station men would all go back to their cities and cite the experiences of New York and Boston as given in the paper, they could sell police and fire apparatus to all of them. All should note the results of speed and the like as regards fire apparatus.

Mr. Miller, of the Couple-Gear Freight Wheel Co., said that there is nothing the central stations can do more for the benefit of the industry than to urge upon their municipalities the adoption of electric vehicle apparatus, and that the personal influence of the central stations should be brought to bear on the city officials.

# The Electric Stevedore in Railroad Service

## Pennsylvania Railroad a Pioneer User of Electric Industrials

Of particular interest in connection with the recent development of the electric industrial truck was the paper by T. V. Buckwalter, of the Pennsylvania Railroad Co. on "Industrial Trucks in the Service of the Pennsylvania Railroad Co." Among Mr. Buckwalter's remarks were the following:

### Industrial Trucks in the Service of the Pennsylvania Railroad

**By T. V. Buckwater**

THE industrial truck as at present developed comprise several general classes, as governed by condition of service. These are:

Baggage and mail trucks for use in passenger stations.
Warehouse trucks for freight stations and warehouses.
Shop trucks for railroad shops and general industrial purposes.
Electric tractors for propelling freight cars over street railway track.

There are no well defined lines of demarcation between the first three classes and several modifications of each class have been constructed, as demanded by the condition at each installation.

**Baggage Truck.**—The baggage trucks are characterized by a height of about two-thirds the distance from the platform to the baggage car floor. This works out at about 30 inches. The length is controlled generally by existing elevator sizes and ranges from 9 to 12 feet. The width is slightly greater than the length of large trunks, generally 44 inches.

A modification of the baggage truck has a body only 9 inches high for use in depressed track stations where the car floor is but slightly higher than the station platform.

**Warehouse Trucks.**—The electric warehouse trucks are characterized by a depressed portion at one end to facilitate loading, and delivery of the load into the end of the car.

The restrictions limit the height to about 10 inches, the width to about 40 inches and the overall length to less than 9 feet.

**Shop Trucks.**—The use of shop trucks is subject to a variety of conditions as regards relative size and bulk of material handled. This has required a number of modifications in truck sizes.

A distinct shop truck class has therefore not been developed but adoption made of baggage and warehouse classes.

**Double End Control.**—Railroad stations and shops are generally congested, runways as narrow as conditions will allow, therefore with the object of avoiding the necessity of turning around, thereby blocking other traffic, railroad industrial trucks have been constructed with double end control. This feature permits of operation with equal facility in either direction, reducing congestion to a minimum.

An exception is the warehouse truck which must have the low frame available for operation into freight cars.

**Four-wheel Steer.**—Space required to turn is still further reduced by steering four wheels instead of two, and operation is made exactly in either direction. This eliminates the dangerous practice of running two-wheel steering trucks backward.

**Two-wheel Drive.**—Sufficient traction for all ordinary work is available with two-wheel driving and therefore four-wheel driving complication is avoided.

**Voltage.**—The voltage of industrial trucks has been selected after a careful study of the advantages of prevailing commercial truck standards and of much lower voltages, and was finally adopted at 24 volts as the minimum at which efficient motors were adopted at 24 volts as the minimum at which efficient motors were obtainable, in consideration of the preponderant advantages of the low voltage battery.

The 24-volt battery has the following advantages:

Minimum number of cells, meaning simplicity,
Minimum number of connectors,
Consequently,
Minimum possibility of jar and connector breakage,
Minimum cost per unit of capacity,
Minimum weight per unit of capacity.

**Capacity.**—The capacity of industrial trucks was worked out at 4,000 pounds as the maximum that could be readily and safely handled within narrow and congested enclosures, in consideration of the absolute necessity of quick stopping and positive and quick manipulation of control mechanism.

Larger than 4,000-pound trucks are too cumbersome and smaller trucks do not handle enough to realize the full efficiency of the service.

A 50 per cent overload factor has been found desirable which makes a total weight as much as can be quickly handled.

**Speeds.**—High speed capacity has been found of little or no value for the reason that the speed is entirely a matter of condition and amount of congestion of runways, presence of other people who have other duties besides looking out for trucks. Therefore the speed has been gradually reduced as our experience increased to the present standard of 6 to 7 miles per hour with the empty truck and 5 to 6 miles per hour loaded.

The foregoing is intended as a general description of trucks designed to meet railroad conditions of service as these conditions appear to railroad men. If certain characteristics are considered essential in an industrial truck, every effort has been made to obtain such desirable characteristics, sometimes at an increased cost over simpler but less efficient structures.

**Operating Results.**—It is understood this Association is interested chiefly in operating results. The appended table entitled Summary of Operating Data, year 1914, should be found particularly interesting.

This table shows all labor and operating charges for the year 1914 for a total of 212 trucks.

The table is arranged in two sections devoted

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to total charges for all trucks at each installation, and averages per truck month for each installation.

There is naturally a wide variation in some of the charges, due to difference in current cost ranging from 5 mills to 10 cents per kilowatt-hour to the number of trucks in the installation, and the character of the work.

The shop trucks include labor charges of drivers but the baggage trucks do not include these charges for the reason that the trucks are driven by the baggage porters.

The installations are given an efficiency standing based on saving on shop trucks and on cost of operation on baggage trucks. The former is computed on saving because these trucks handle work formerly done by manual labor and the saving is readily computed. However, the figures do not represent the total saving, as for instance increased efficiency of the shop due to having material handled on a regular and prompt schedule does not admit of calculation. The old practice of helping out the labor gang with machinists is largely avoided.

The saving effected in baggage service is considerable and some figures are available but were not considered sufficiently complete to be presented at this time. This saving is difficult of calculation. The character of the service has changed considerable since the introdoction of electric trucks. The Parcel Post, formerly nonexistant, is now a large and important part of the work. The labor force has not, generally speaking, beeo decreased, but oo the other hand, the business has increased.

Rush periods can now be handled without borrowing untrailed men from other departments. A better class of men continue in service, as compared with the rapidly changing force in the old days.

The operating people consider that the most important advantage of electric baggage trucks is relief to terminal congestion and prompt despatch of trains resulting from avoidance of baggage detention.

The saving effected is not stated on certain installations. This does not indicate absence of saving but failure of operating people to ascertain same in time for this paper. The installations omitted would be near the top of the list.

Under the heading Number of Trucks is indicated the number at the beginning and end of the year but averages are based on actual truck months.

### Tractor Switches Freight Cars

Mr. Buckwalter also gave details regarding the giant electric switching and shunting tractor used by his company.

The question was asked as to why the vehicle was equipped with rubber tires instead of being an electric locomotive and running on the track.

Mr. Buckwalter replied that the reason was because by not being confined to the tracks the tractor could go after cars anywhere, run around them in spotting a particular one further down the track, and, in short, do much more work. He also stated that on a track of 50-foot radius, which is a very sharp curve, the tractor running on the ground could outpull any locomotive or rail tractor he knew of. It can get on the tangent more and thus have a direct pull, where a tractor on the rails would be pulling at an angle.

Mr. Buckwalter also stated that all the higher voltage batteries which the railroad had previously used were now changed over to a standard of 24 volts, for reasons of interchangeability, efficiency in this class of service, etc. The Pennsylvania is using some 85-volt batteries in street trucks, however. As the industrial truck in this service requires a low loading platform, it therefore cannot have very deep cell trays, and this, together with the desirable short wheelbase, really forced the adoption of the low voltage classification of 24 volts.

T. H. Schoepf regarded this as one of the most important papers, because it dealt with a subject that many concerns are overlooking. His company started with two of the industrial trucks and now has eight. One of them replaces sixteen men and a hand truck. They deliver 294,000 pounds a day with a mileage of 37.

W. H. Conant asked as to the practicability of electric tractors either on rails or tires. He urged upon the pioneers in the electric vehicle business to give more attention to the industrial truck field, else others will step in and take that branch of the business from them.

## The Small Electric and Its Application

"The Small Electric Vehicle and Its Application" was discussed by Charles A. Ward, of the Ward Motor Vehicle Co., who just now is pushing the Ward Special 750-pounder in connection with the new Edison battery maintenance system. Mr. Ward pointed out the need of an electric vehicle to carry a moderate load for city duty where short hauls and congested traffic rendered the light gaso-

(Continued on page 38)

### Electric Trucks—Summary of Operating Data, Year 1914.

Shop Trucks.

| Shop | Average monthly data all trucks | | | | | | | | | | | Averages per truck month | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. of trucks | Labor | | | Material | | | Kilo-watt-hours | Cur-rent cost | Total cost | Total cost | Cur-rent cost | Saving | Per-centage (See note 2) |
| | | Driver | Truck repairs | Battery repairs and charging | Truck | Battery | Tire | | | | | | | |
| Harrisburg | 1 | 48.98 | 2.62 | 1.76 | 1.89 | 4.40 | 5.39 | 209 | 5.43 | 70.47 | 70.47 | 5.43 | 154.80 | 100.0 |
| Verona | 1 | 59.96 | 5.39 | 2.74 | 1.55 | 1.09 | 3.48 | 587 | 8.81 | 82.94 | 82.94 | 8.81 | 154.65 | 99.8 |
| Trenton | 1 | 32.48 | 5.72 | 2.84 | 8.36 | 1.56 | 6.35 | 792 | 9.90 | 67.20 | 67.20 | 9.90 | 134.9 | 87.0 |
| Juniata | 2 | 76.64 | 13.23 | 11.82 | 5.56 | 11.42 | 1.73 | 1,426 | 11.14 | 131.33 | 65.66 | 5.57 | 209.15 | 70.5 |
| Altoona car shops | 3 | 116.96 | 12.52 | 18.26 | 21.06 | 12.54 | — | 1,251 | 8.57 | 190.61 | 63.60 | 2.85 | 96.12 | 62.0 |
| Renovo | 2 | 92.95 | 2.84 | 12.35 | 1.63 | 8.28 | — | 1,168 | 18.05 | 136.10 | 68.05 | 9.02 | 93.61 | 60.4 |
| Mt Carbon | 1 | 32.36 | 0.39 | 2.89 | 0.40 | 1.13 | — | 272 | 8.80 | 45.47 | 45.47 | 8.80 | 93.22 | 60.1 |
| Altoona machine shops | 9 | 560.42 | 88.96 | 35.89 | 45.79 | 13.72 | 29.77 | 2,242 | 14.06 | 788.61 | 87.62 | 1.56 | 92.22 | 59.5 |
| Pitcairn | 4-5 | 168.46 | 44.46 | 30.24 | 22.07 | 22.64 | 20.81 | 789 | 4.05 | 312.75 | 67.99 | 0.88 | 89.64 | 57.9 |
| South Pittsburgh | 1 | 42.35 | 1.83 | 1.79 | 0.22 | 0.51 | — | 392 | 4.60 | 51.27 | 51.27 | 4.60 | 64.04 | 41.3 |
| Meadows shop | 1 | — | 2.85 | 1.06 | 0.74 | 0.08 | — | 734 | 29.40 | 34.13 | 34.13 | 29.40 | 21.75 | 14.0 |
| Sunnyside yard | 10-14 | — | 40.89 | 14.32 | 22.29 | 3.21 | 12.80 | 4,938 | 38.86 | 133.37 | 12.73 | 3.74 | — | — |
| West Philadelphia | 1 | 10.27 | 1.68 | 0.06 | 0.01 | 0.06 | — | 208 | 1.44 | 13.54 | 13.54 | 1.44 | — | — |
| Jersey City Pier L | 3-5 | — | 30.10 | 30.93 | 22.18 | 35.05 | 9.38 | 1,340 | 45.77 | 173.42 | 51.00 | 13.46 | — | — |

Baggage Trucks.

| Station | Average monthly data all trucks | | | | | | | | | | Averages per truck month | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. of trucks | Labor | | Material | | | Kilo-watt hours | Cur-rent cost | Total cost | Total cost | Cur-rent cost | Saving | Per-centage (See note 3) |
| | | Truck repairs | Battery repairs and charging | Truck | Battery | Tire | | | | | | | |
| Baltimore | 2 | 6.54 | 6.02 | 1.30 | 0.62 | 1.53 | 953 | 11.50 | 27.50 | 13.75 | 5.75 | — | 100.0 |
| Philadelphia | 34-35 | 87.55 | 96.56 | 128.52 | 12.30 | 8.19 | 6,821 | 88.16 | 421.58 | 10.93 | 3.58 | — | 81.8 |
| Pittsburgh | 17-28 | 158.50 | 136.98 | 128.90 | 40.07 | 3.43 | 6,731 | 34.96 | 503.13 | 17.97 | 1.25 | — | 76.3 |
| New York | 64-66 | 198.11 | 172.03 | 248.73 | 471.18 | 23.64 | 5,016 | 66.53 | 1,184.48 | 18.06 | 1.02 | — | 76.1 |
| North Philadelphia | 4-10 | 23.29 | 33.28 | 15.09 | 32.70 | 6.11 | 1,534 | 43.56 | 154.09 | 24.85 | 7.03 | — | 55.3 |
| Washington | 18 | 90.46 | 58.17 | 67.59 | 37.91 | 114.72 | 11,810 | 88.88 | 455.00 | 25.28 | 4.77 | — | 54.4 |
| Jersey City | 3-5 | 40.88 | 17.66 | 16.24 | 21.41 | — | 956 | 19.12 | 115.38 | 29.38 | 4.90 | — | 46.3 |
| Harrisburg | 1 | 10.44 | 4.17 | 0.96 | 30.02 | — | 588 | 12.01 | 66.60 | 66.60 | 12.01 | — | 30.0 |

1. The efficiency standing of each truck installation is indicated on a percentage basis. 2. Shop truck efficiency is based on saving in labor effected 3. Baggage truck efficiency is based on cost of maintenance per truck month. 4. In each case the best showing is indicated as 100% efficiency.

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## SHORT, CLOSE-TURNING TRUCK

### To Displace Ash Carts on Ferries, Special Vehicle Design is Needed

To the Editor, COMMERCIAL VEHICLE: We are considering the use of a motor truck to handle coal on and ashes off our ferry boats at our Jersey City terminal in place of the horse carts now used.

The truck must be equipped either with a movable body that will dump its contents to either side or to the rear, or it should have a sloping bottom with hinged sides or end so it will clear itself of its load without tipping.

We think a truck of about 6 cubic yards capacity will be what we can use to best advantage. It may be, however, that a smaller truck will suit our purpose better, depending upon the design of the truck.

The body and wheelbase must be very short—the shorter the better—but not over 6 or 8 feet, and the truck must be able to turn completely around within a circle with a radius not greater than the wheelbase of the truck.

Will you kindly advise me what concerns manufacture trucks of this character and give me a list of the concerns most likely to have such a truck? Will you kindly also advise if you know of any trucks being used for a similar purpose, and if so, where?—F. A. Howard, engineer of bridges and buildings, Erie Railroad Co., New York City.

As it is not stated why a motor truck must conform to the exceedingly small dimensions given, it must be assumed that the reasons are good and sufficient. However, it would seem that some means could be devised whereby the ashes could be raised from the hold of the ferry and dumped into a truck drawn up on one of the end decks and the coal chuted down into the hold through a hatch in the deck, in which case a standard 5-ton dumping truck could be used, side boards being used to provide greater cubical capacity for ashes, which are lighter than coal and which therefore may be taken in greater quantity.

Failing this, it would seem that an electric industrial truck of 2 yards capacity could be advantageously employed to take the ashes from the boat and to load the coal, relaying the loads to and from larger trucks on the shore. Either of these alternatives would entail less expense, in all likelihood, than would be involved in the construction of a special vehicle along the lines specified.

A 6-yard body, if of rectangular section and not over 8 feet long, would have to be 6 feet wide and 3 feet 4½ inches high to hold a level 6 yards, or heaping possibly 3 feet high, which is a rather cumbersome article to handle in so small a space as 16 feet.

From the data given it is evident that the truck has to load in the roadway at its narrowest portion, namely, alongside the engineroom trunk, and from the fact that it is required to turn in the narrow space instead of running around the outer edge of the craft, on a radius of possibly 20 feet, it is evident that the work in coaling and ash removal must be carried on while other vehicles are on the vessel.

While there are few trucks of 6 yard capacity which could be built on an 8-foot wheelbase, this specification could no doubt be met but for the requirement of a 16-foot turning arc. With standard construction, incorporating front wheel steering only, it is doubtful if with maximum possible cramp a smaller turning circle than 24 feet could be arranged with an 8-foot wheelbase, or of 18 feet with a 6-foot wheelbase, the latter wheelbase being impracticable for so large a body. With four-wheel steer only it is possible for a four-wheeled truck of conventional lay-out to turn in a radius of its own wheelbase, and in practice even this is seldom accomplished.

The only vehicle of the type mentioned of which THE COMMERCIAL VEHICLE has any knowledge is that of the Blackstone Valley Gas & Electric Co., Pawtucket, R. I., for whom the Couple-Gear Freight Wheel Co., Grand Rapids, Mich., built an electric truck of 3½ tons capacity.

This truck had a body of something nearer 4½ cubic yards capacity than 6 an 8-foot wheelbase and four-wheel drive and steer by means of the characteristic Couple-gear motor-wheel, but although it was designed to permit operation in a congested cellar with low headroom and obstructing pillars, its outside turning circle was 27 feet.

If the inner wheels of such a truck could be cramped to 45 degrees, the turning circle would still be 20 feet overall, not including any overhang of the body or cab front or rear. Similarly with a two-wheel-steered vehicle the minimum turning circle of an 8-foot wheelbase with a 45-degree inside wheel cramp would be about 31 feet, including the width of the wheel and not counting vehicle overhang.

It is impracticable for structural reasons for a greater cramp than 45 degrees to be used for any inside wheel, and this limits us to the above turning circles as illustrated in Figs. 1 and 2. It is possible that by permitting gross inaccuracies in lay-out this turning circle might be somewhat reduced at the sacrifice of tire wear, to the certain detriment of road surfaces and at the cost perhaps even of mechanical difficulties.

Merchant & Evans, Philadelphia, Pa., have built a few tractors of the front-wheel-driven type which, contrary to orthodox practice, turn on a single kingbolt, like a horse wagon, thus permitting a turn to be made in even less than twice the wheelbase of the vehicle, but it is doubtful if even such a vehicle could conform with the specifications given.

The Mercury Mfg. Co., Chicago, manufactures a three-wheel tractor capable of being turned in 16 feet. This vehicle, however, has only three wheels and a 6-foot wheelbase. By means of a special

(Continued on page 39)

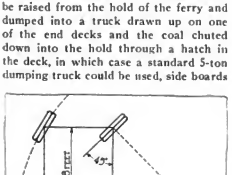


Fig. 1—Sharpest turn possible with two-wheel-steered truck with conventional arrangement

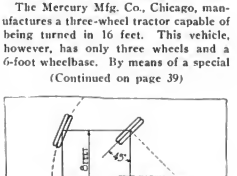


Fig. 2—Turn possible with four-wheel steer by conventional axle construction

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Fig. 1—B. A. Gramm 6-tonner fitted with contractors' dumping body and Wood hydraulic hoist

## 6-tonner Completes Worm Line of Gramms

COMPLETING the line of worm-driven trucks produced by the Gramm-Bernstein Co., Lima, O., a new model rated at 5 to 6 tons capacity has recently been added to the 1916 offering of B. A. Gramm trucks. The other trucks are of 1, 1½, 2½, 3 and 3½ tons size, respectively, and all models are similar in general lay-out.

The new heavy-weight replaces the former 6-ton chain-driven B. A. Gramm, and like all of the more recent B. A. Gramm productions has its motor under a conventional hood instead of between the seats as in the first 2- and 3-ton models. Another departure to be found in this model is in the motor, which instead of having six cylinders as previously, has but four. The use of the six-cylinder motor was occasioned by difficulty in obtaining a four-cylinder engine of the same characteristics as used in the smaller models in as large size as demanded for heavy work. Such a motor has now been obtained. The six formerly employed was of 4⅛-inch bore and 5¼-inch stroke, having a displacement of about 425 inches, while the new four, with cylinders 4½ by 6¾, has 375 inches of displacement, the respective horse-power ratings by the standard formula being 40.8 and 32.4.

The present B. A. Gramm line consists of the following models, tabulated according to principal specifications:

| Capacity tons | Price | Wheel-base | Tires front | Tires rear | Drive |
|---|---|---|---|---|---|
| 1 | $1,500 | 118 | 34x3 | 34x4 | worm |
| 1½ | 1,800 | 130 | 34x3½ | 36x3 | worm |
| 2½ | 2,600 | 156 | 36x4 | 36x4d | worm |
| 3½ | 3,400 | 158 | 36x5 | 40x5d | worm |
| 5-6 | 4,300 | 168 | 36x6 | 40x6d | worm |

Any of these models will be equipped with an electric lighting and starting system for $200 extra, or with the lighting system only for $100.

Motors are suspended direct from the mainframes with the gearboxes located amidships, so as to break up the drive-shaft into two sections of approximately equal length, thus avoiding excessive length which causes whipping in some cases.

The motor of the 6-tonner is cast in pairs, with valves to the left. It is equipped with a centrifugal governor, driven from the motor and fully inclosed and sealed against tampering, which restricts the speed to 11 miles per hour. Centrifugal pump water circulation is provided, the water passing through a cast case radiator with vertical finned tubes. This radiator is suspended independent of the motor or hood to give it greater freedom and supported by two rods joining its top with the dash.

Choice of Stromberg or Zenith carbureters is offered on chassis either for domestic or export purchase, fed by gravity from a tank beneath the seat. A Bosch magneto is used for ignition.

A feature of Gramm trucks is the clutch and gearset system, the former being of the dry-plate type, inclosed in the flywheel, and the latter a special construction always used on B. A. Gramm vehicles and of the constant-mesh individual-clutch type. It provides four

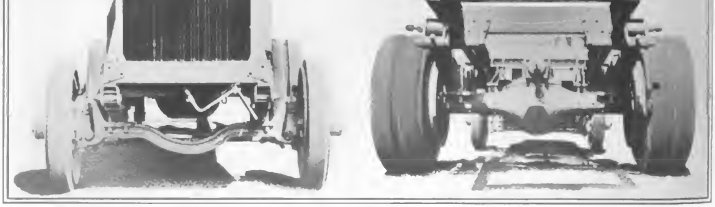

Fig. 2—Front and rear views of B. A. Gramm 5-6-ton chassis. Note folding crank, massive radiator and Sheldon worm-driven rear axle

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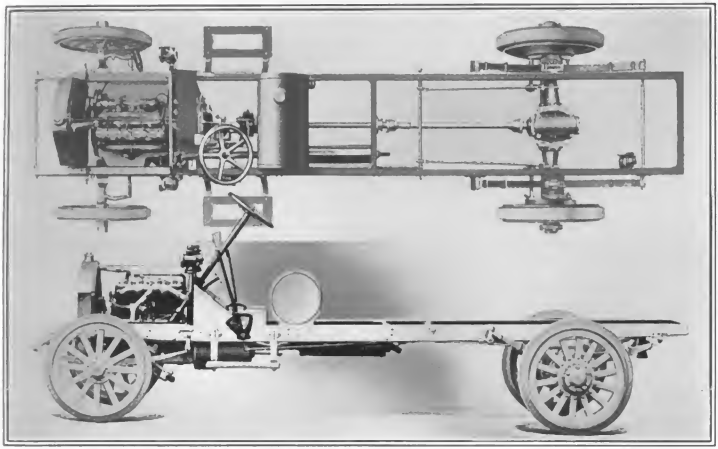

Fig. 3—Chassis views of 1½-ton worm-driven Stegeman, showing clean chassis lines and long springs, rear spring shackled in front instead of behind

speeds forward and a reverse, all of the gears being always in mesh, the driven gears on the mainshaft running free on their shafts. Dog clutches are used to connect these free-running gears with the driven shaft, the operation of these clutches being on the selective principle in exactly the same manner as with a selective sliding gearset. The change-gear lever quadrant is of the H type and provided with a lock to prevent the clutches from becoming unintentionally disengaged.

This system greatly facilitates engagement as the jaws of the clutches are large and each alternate jaw is shorter than its neighbor. In the event of faulty manipulation stripping of gears is said to be impossible owing to the fact that they are always meshed for their full width. The worst that could happen would be the breaking of a clutch jaw and owing to their robustness even this is unlikely. In such an event however replacement of a simple dog clutch would be found cheaper than that of a gear wheel.

The driveshafts, between the clutch and gearset and from thence to the axle are solid bars, each carrying two universals. Normally these shafts lie in a horizontal plane.

The axle is the new 5- to 6-ton Sheldon job, described in the October 15 issue of THE COMMERCIAL VEHICLE. Driving torque and thrust or propulsion are taken entirely by the springs, which are 48 inches long and 3½ inches wide. The frames on both the 6-tonner and the 3½-ton model are of rolled channel steel, pressed steel frames being employed on the smaller sizes. The wood wheels have square spokes, with pressed-on tires.

The engine hood is slightly tapered and provided with large louvres. Either right or left steer is furnished, the former for foreign sale and the latter for American use. Spark and throttle levers are located on the steering column below the wheel.

## Inclosed-drive Stegemans

INNOVATIONS in the line of the Stegeman Motor Car Co. include the superceding of chain drive formerly used by worm drive, Timken equipment being employed. Others are the use of new Continental motors, a 6-cylinder type being employed on the larger model of the three-chassis line, and changes in the control system.

The new line embraces capacities of 1½, 2½ and 3½ tons. Previously five models were produced, but the 1,500-pounder and the 5-tonner have been dropped for the time being. Price reductions have also been made, as shown in the following table of salient features:

| Capacity tons | New price | Old price | Wheel-base | Tires front | Tires rear | Drive |
|---|---|---|---|---|---|---|
| 1½ | $1,900 | $2,100 | 150 | 34x3½ | 36x5 | worm |
| 2½ | 2,500 | 2,800 | 144 | 34x4 | 36x4d | worm |
| 3½ | 3,000 | 3,350 | 162 | 36x4 | 40x5d | worm |

Motors are suspended directly from the frames and with their clutches and gearsets constitute unit power plants. They are of the same type as formerly used on the chain-driven types. Details follow:

| Capacity tons | Bore | Stroke | S. A. E. hp. | Speed, m. p. h. |
|---|---|---|---|---|
| 1½ | 4⅛ | 5⅛ | 27.3 | 18 |
| 2½ | 4⅛ | 5⅛ | 27.3 | 15 |
| 3½ | 3¾ | 5¼ | 33.75 | 12 |

Cylinders are cast in block, with valves

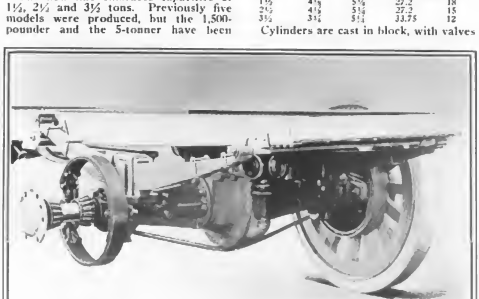

Fig. 4—Detail view of Stegeman rear system, showing Timken worm-driven rear axle

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to the left, and are cooled by centrifugal pump circulation through conventional cellular radiators, and Stromberg carbureters, fed by gravity from cylindrical tanks beneath the seats, are provided. The motors are equipped with governors of the centrifugal type, driven from the motors. Eisemann automatic-advanced high-tension magnetos are used for ignition.

Dry multiple disk clutches are employed and three-speed selective gearsets, from which the drive is taken by a triple-jointed shaft, on each model, to the rear axle, the center of the shaft being anchored to the frame to reduce the free length of shafting, thus avoiding whip.

Hotchkiss drive is used, there being no radius rods or torque members, and the frames are of pressed steel with integral front spring horns. Hand brakes are on the rear wheels, internal, and the foot brake is on the driveshaft, just back of the gearset, where it is readily adjusted by taking up the floorboards.

Left steer and center control are employed, there being no control levers on the steering column. This is made possible by the use of automatic spark advance and the use of foot control of the throttle. Another interesting feature in the control system is the combination of the duties of clutch control and foot brake actuation in one pedal. The change-gear lever is placed in the center of the cab and the hand brake lever on the left of the cab.

A feature of the Stegeman truck is the use of bronze bushings throughout, so that any wearing part may have its bearing portions renewed. Another feature is the exceptional length of springs. Those in the rear on all models are 5 feet long, the front ones being 42 inches on the two smaller sizes and 46 on the big model.

A point meriting especial attention is the attachment of the rear springs to the frame. Instead of the shackle being at the rear and the fixed eye at the front, the spring is attached in the reverse manner, thus transmitting the propulsion as a pull on the rear spring half instead of a push on its front half.

A country road model in 2½-ton size is offered as previously by the Stegeman company, this model being characterized by 56½-inch tread both front and rear.

## A Lighter Bessemer

SMALLER than previous models and differing in the method of final drive, a new truck has just been brought out by the Bessemer Motor Truck Co., Grove City, Pa. The new truck adds a fourth to the line of three other models produced by this concern, the other three being worm-driven 2- and 3½-tonners and a chain-driven 1½-tonner. The latest is of 1,500 pounds capacity, has internal-gear drive and lists at $975. The full range at present is as follows:

| Capacity | ¾-ton | 1½-ton | 2-ton | 3½-ton |
|---|---|---|---|---|
| Price | $975 | $1,600 | $2,000 | $2,500 |
| Wheelbase | 124 | 136 | 136 | 150 |
| Tires, front | 32x3 | 37x3½ | 37x4 | 37x5 |
| rear | 36x3½ | 37x5 | 37x5½d | 37x6d |
| Drive | Int g | chain | worm | worm |

In the new model the general outline resembles that of previous productions, the motor being forward under a hood, suspended direct from the frame and incorporating the clutch and gearset in a unit power plant. Like all other models, this one has a Continental motor.

| Capacity | ¾-ton | 1½-ton | 2-ton | 3½-ton |
|---|---|---|---|---|
| Bore | 3¼ | 4¼ | 4¼ | 4½ |
| Stroke | 5 | 5¼ | 5¼ | 5½ |
| S. A. E. horsepower | 19.6 | 27.2 | 27.2 | 32.4 |
| Speed, r. p. m. | .... | 1,140 | 1,140 | 1,000 |
| m. p. h. | 21 | .... | 15 | 12 |

The motor of the new model, while smaller than those on the larger ones, is similar in general design. Its four cylinders are cast in block with the valves to the right. Water-circulation is by thermo-syphoning through a finned-tube vertical radiator with a sheet-metal case. A Rayfield carbureter is used and the motor is not governed.

Bosch single ignition is employed, the spark being hand advanced.

The clutch is of the dry-disk type and drives to a conventional three-speed selective gearset, the final reduction in the Torbensen internal-gear-driven axle being 6½ to 1. A double-jointed shaft connects the two and the springs are relied upon to take care of torque. Two long radius rods take propulsion.

The frame is of pressed steel with integral front spring horns and all brakes are on the rear axle. Left steer and center control are used and the chassis is fitted with substantial fenders.

## The Small Electric

(Continued from page 34)

line truck, in some cases, inefficient. He pointed out that a great portion of the delivery loads of mercantile houses do not exceed 750 pounds in weight and that therefore a heavier truck is unnecessary for this field. That such a vehicle must be light and economical of maintenance, without being unduly limited in power or mileage, was emphasized, and also that it must be neat in appearance, silent, simple.

To demonstrate what can be done with a small electric delivery vehicle of 750-pounds carrying capacity, Mr. Ward had one of his new machines driven cross-country from New York to Cleveland. An interesting motion picture of the journey was shown the convention and indicated the ease with which the little truck made the run.

The discussion was brief, there being little dissenting voice to the possibilities of such a type of car, although some felt that it should perhaps be of slightly larger capacity.

The Ward truck in coming from New York was charged twenty-five times, although it very often did not actually require any boosting. This extra charging was simply done to avoid any possibility of running down.

The total distance covered was 740 miles, and for the run 1,564 ampere-hours of current was used. The battery is a 65-cell G-4 Edison.

Fig. 5—New ¾-ton Bessemer, showing internal-gear-driven rear axle

## The Field of the Trailer

(Continued from page 32)

wheeled trailer or an independent two-wheeled unit, or whether a trailer at all, depends to a great extent on the conditions under which the outfit is to work. The use of the four-wheeled type enables the full drawbar pull of the truck to be realized by hauling as many units as is necessary. Shod with rubber tires all around on wheels carried on roller bearings, this type can be conveniently moved from place to place and loaded. The truck must be held idle while being loaded while with the semi-trailer this time may be eliminated by loading the latter while the tractor is working and then placing it in position on the tractor by an overhead mechanical trolley or by jacking it up. Semi-trailers may also be moved from place to place at the loading or unloading platform by the use of an extra fore-carriage pulled by men or by horses where the load is heavy.

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The semi-trailer also has the advantage of carrying the greatest portion of its load on steel tires, which are much cheaper than rubber, although the trailer wheels and springs must be of the best material and manufacture in order to stand the tractor speeds. Rubber tires on trailers are guaranteed 60 per cent greater mileage than truck tires.

Both types of trailers may be backed into position, although the two-wheeled unit requires considerable manuevering on the part of the driver and the four-wheeled type must be steered into position by a man on the ground.

Several of the makes of semi-trailers now on the market are supplied with brakes, and it is predicted that all of them, with the four-wheeled type in addition, will have brakes to relieve those on the tractor for the sake of safety, as in the rapid stopping of a train or tractor unit in case of emergency. The trailer principle as applied to motor trucks has come to stay.

Part II of this article will appear in the November 15 issue of THE COMMERCIAL VEHICLE and will picture and describe all types of truck trailers now on the American market.

### Short, Close-turning Truck

(Continued from page 35)

tow-hitch it is able to draw trains of any number of trailers up to a dozen or so, each of which tracks exactly with the tractor. These trailers are of the 1¼-yard capacity and may easily be pushed about by man power.

The work of this tractor in the service of the Union Stock Yard & Transit Co., Chicago, and a description of the Couplegear truck above referred to will be found in the October 1, 1914, and November 1, 1913, numbers of THE COMMERCIAL VEHICLE.

# New Torbensen 1-ton Axle

## Greater Accessibility and Oilproofness are Features

SINCE combining with the Yuster Axle Co. in Cleveland under the name Columbia Axle Co., the Torbensen Gear & Axle Co. has brought out a new model of internal-gear-driven Torbensen axle of 1-ton capacity in which several important improvements have been made. The new axle is designated Model A, and while it is similar to the former models, the differential housing has been improved by the provision of a separate cover plate at the back by which ready access to the gears is obtained. There are also changes in the proportions of the axle such as permit of larger gears and a greater range of gear ratios, improvements in adjustments and in the method of assembly.

The feature of combining an I-beam dead axle to carry the wheels with a light jackshaft carrying the differential, shafts and internal gears is continued, the jackshaft being located behind the I-beam, with the third member passing through a yoke in the I-beam web as previously.

In the I-beam 1/16 inch of stock has been added to the section of the flanges, the bore through the yoke has been enlarged, and the jackshaft has been moved farther back of the I-beam to provide greater room for the differential.

The jackshaft tubes instead of being pressed into the housing and riveted, as before, are now merely pushed into the housing and large felt washers laid in pockets surrounding the tubes to provide oil-tightness. Similarly, the connection at the drum ends has been made more flexible, although oil tight. It was found that under the old method, no matter how tightly fitted the tubes might be, they worked loose and eventually leaked oil and grease. This was due to the rigidity combined with slight twisting of the axle. By making the tubes flexible in their mountings this difficulty is obviated and assembly facilitated.

Adjustment of the bevels in every direction is provided in the new axle, and with the new split differential case these may be made with the axle running on a stand. All adjustments are provided with positive locks.

Instead of being squared at the differential ends and taper keyed at their outer ends, the jackshafts are now splined at both ends, thus making them easier to insert and remove, rendering the removal of the spur pinions easier and providing a better driving surface.

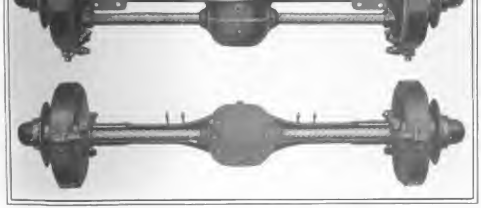
The internal gear is now pressed into the malleable iron hubs under sufficient pressure to true it should it have become slightly warped in heat-treatment. Before treatment it is drilled for the rivets and these drill-holes are used as jigs for the holes drilled in the hub flange after the gear ring has been pressed in.

Bock roller bearings are used for the differential and third member and Bower rollers for the wheels and jackshaft ends. Brakes are of 15-inch diameter, both on the wheel drums, one set internal and the other external, and act on the same drums. The brake connections are disposed so as to come inside the frame members.

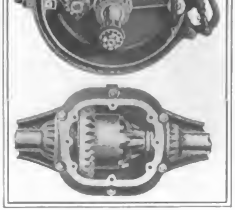
Special arrangements have been made to prevent grease from the wheels or internal gears from reaching the brake drums. A shield extends out from the brake carrier and covers the open side of the internal gear so that any grease escaping the latter is caught by the shield and drained off to the outside through an opening provided for the purpose, where it clears the brake drum entirely. Without the drain the lubricant would be forced to find an escape itself and would probably reach the drums.

The axle has a maximum safe capacity of 3,500 pounds of total weight and 20 horsepower. It is made in the standard gauge of 56 inches and for spring centers a maximum of 39½ inches apart. It will take springs from 2¼ to 2¼ inches wide.

Gear-ratios up to 8 to 1 are allowed for and fourteen spokes are arranged for in the hubs. The axle is said to weigh 360 pounds.



Torbensen axle complete, top and back views showing I-beam dead axle and new jackshaft



Brakes and internal gear
New accessible differential

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# Accessories for the Truck

## NORTHERN MOTOR TRUCK WINCHES

Power-driven and offered in sizes from 1,000 to 2,000 pounds capacity, single line, Northern winches, made by the Northern Engineering Wks., Detroit, can be used either in the form of any ordinary winch for hauling articles on or off a motor truck or in connection with a boom and tackle.

The hoist is of the platform drum-winch type and is made in both spur-geared and worm-geared form, all the gears being inclosed.

The winch is driven by the motor of the truck through a clutch connection on the propeller shaft. The device is usually placed directly aft of the driver's cab and operated by the driver through a lever on one end of the drum shaft.

This type of winch can be applied to any type of truck but is usually recommended for those of heavy capacity.

This device is particularly adapted for use on trucks which have to carry heavy or unwieldy objects, for it enables these to be loaded much more quickly than by lifting them by hand.

## PITTSBURGH MOTOR TRUCK SEARCHLIGHT

Employing a powerful focusing lens in connection with an 8-inch parabolic reflector, which gives a strong beam of light, although the current consumption is only 1 ampere, the Pittsburgh motor truck searchlight is mounted on a bracket so constructed that it can be turned in any direction and at any angle. The light, just offered by the Pittsburgh Electric Specialties Co., Pittsburgh, Pa., has a 6-volt Mazda bulb, which permits it to be used with any 6-volt lighting system or with dry batteries.

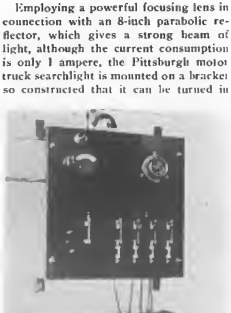

Fig. 1—The Lincoln small-battery charger which is started by current from the battery

The light is carried on a forked bracket attached to a stand which may be mounted on the dash, floor or seat of the driver's cab. The bracket is joined to the stand by a double-jointed connection consisting of a small knob, straight-sided at the top, and free to revolve on a pin in the top of the stand. The lower end of the forked bracket is slotted to fit over the top of the knob and is held thereto by a bolt and thumb-screw inserted through holes in each member. The knob provides any horizontal movement and the thumb-screw any vertical motion. A bracket connection of this description permits the light to be used for turning or backing the truck around corners, for spotting house numbers and street signs, as well as for providing illumination of the road directly ahead.

The light is provided with a handle for turning and may be detached from the bracket to serve as a trouble lamp. When used with dry cells the light constitutes an independent auxiliary headlight system for use in case of failure of the regular headlights. The light is shown in Fig. 2.

## FT. WAYNE SMALL BATTERY CHARGERS

Designed especially for service in garages for charging motor vehicle lighting and ignition batteries, the Ft. Wayne chargers, made by the Ft. Wayne works of the General Electric Co., Ft. Wayne, Pa., are of the motor-generator type and offered in two sizes of 175 and 250 watts output for service on 110- or 220-volt, 60-cycle, alternating-current circuits, or on 110- or 220-volt direct-current circuits. Both types are supplied to deliver direct current for charging 12-, 18- or 24-volt batteries. Each model consists of a motor and generator mounted on one horizontal shaft and inclosed in a cylindrical case to the top of which is attached a slate switchboard carrying all the necessary equipment.

Both sets are designed to be connected with the incandescent lighting circuits by means of lamp cord and plug, and due to the fact that the switchboard is incorporated into a unit with the motor case, are so small that they can be conveniently mounted on a garage workbench and take up very little room.

The switchboard of each model has a snap switch in the line circuit for starting and stopping the sets; a snap switch in the circuit from the generator to the batteries to be charged, for opening the charging circuit; a voltmeter for reading the voltage delivered by the generator; an ammeter for reading the charging current and a field rheostat for raising or lowering the voltage of the generator end of the set and thus serving to adjust the battery charging current. The rheostat has sufficient capacity to reduce the voltage of the set to that proper for charging 6-volt batteries. A front view of the assembled unit is given in Fig. 3.

## LINCOLN SMALL-BATTERY CHARGER

Designed for charging a variable number of small ignition and lighting batteries, the Lincoln charger, made by the Lincoln Electric Co., Cleveland, O., is distinguished by the use of a single-phase induction motor which is started by current taken from the battery being charged. The unit consists of the motor and a shunt-wound generator mounted on a two-bearing horizontal shaft. A switchboard, arranged for wall mounting and carrying a starting switch, voltmeter, ammeter and switches for varying the number of cells in charge, completes the device.

Fig. 2—The Pittsburgh motor truck searchlight on bracket which can be turned in any direction

Due to the fact that the conventional single-phase induction motor is not self-starting, some external means have to be taken to effect this result. Ordinarily this is done by the use of a special device which starts the motor as a repulsion type unit and then by short-circuiting the commutator when it has attained sufficient speed, making it of the induction type. The use of the special device for this purpose is eliminated in the Lincoln unit by using current from the battery being charged, the generator acting as a shunt motor.

This method of starting is accomplished by having the two middle clips of the four-pole starting switch higher than the others. These are connected with the battery and engage first as the switch is closed. This throws the

Fig. 3—One model of Ft. Wayne motor-generator units for charging ignition and lighting batteries

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battery across the armature and the machine starts to revolve. When the unit gets up to speed, the switch is thrown entirely in, and the alternating current thrown on, when the set begins to charge the battery.

The batteries are charged in series, the charging current being varied by raising or lowering the field voltage.

The outfit is made in two sizes, the smaller accommodating any number of cells from one to eight, and the larger from one to fifteen. An installed unit is shown in Fig. 1.

### AMALGAMITE

Lubrication without oil or grease is the purpose of Amalgamite, a bearing metal shortly to be produced by the Dann Spring Insert Co., Chicago. This substance is said to be a bearing metal which is impregnated with lubricating substances so that it requires no lubrication. It is to be made in the form of bearings and bushings, piston rings, and other parts subjected to wear.

It is claimed that it can even be used in place of the usual main bearings of an engine, so that no oiling system is needed in the engine.

It is said to be unaffected by heat, cold, water or shock.

It is not as yet ready for the market, and so nothing can be learned about its actual composition, nor is official test data available. However, the Dann company says that it has been undergoing tests for some time in marine engines, compressors, and railroad locomotives with success.

### ARMY AMBULANCE BOARD AFTER MOTORS

WASHINGTON, D. C., October 23—The Surgeon-general of the U. S. Army has appointed a board of three to ascertain what type of motor ambulance is desirable for the medical corps and to adopt it forthwith. Although there is no intimation that the horse is to be discarded from ambulance service, it is understood that greater dependence will be placed in motor equipment than heretofore, both for ambulance and sanitary service.

There are twenty motor ambulances now in the service of the army. The ambulance board comprises Major A. W. Williams, Captain Percy L. Jones and Captain Arthur W. Christie.

## The Motor Reserve Corp

(Continued from page 25)

tary in any plan of organization for national defense. I am heartily in accord with your efforts for the establishment of this corps and wish that ways and means might be provided to make such an organization available as a military asset of this state.'

"There is a probability that most of the members of the American Legion who helped in the transportation of the Seventh Regiment will be desirous of joining the A. R. C. Dr. Hausmann, secretary of the American Legion, informs me that he has assured the National Guard as well as the United States regular troops stationed in New York City that Legion members stand willing at any time to supply cars for the quick movement of their men in case of emergencies. Some of the big concerns which are members of the Legion supplied one and two trucks at the mobilization.

"The exploitation of the A. R. C. has been going on all through the country and organization work is now under way in Seattle, Washington, Baltimore, Maryland, as well as New York City.

"As the Governor of each state is commander-in-chief of the militia, we have addressed a general letter to Governors asking for the official sanctioo of the A. R. C. in their state.

"I have the pleasure to quote the following: Governor Phillips Lee Goldsborough of Maryland writes that he heartily approves of the movement looking to the organization of an Automobile Reserve Corps in this nation and trusts that it may be successfully carried out. Governor E. L. Phillip of Wisconsin, writes: 'The automobile is no doubt a very useful vehicle in times of war. The rapid movement of officers and troops is at times a necessity, and there probably is no better mode of transportation at this time than a gas machine. I will favor such an organization as you speak of if it has the approval of the War Department. It seems to me that military preparations should be arranged for in a systematic manner, and I believe that the War Department has the proper authority to suggest to the public whatever co-operation it may desire along the lines of better military preparation.'

"Before I read any more letters from Governors, please let me quote from a letter that will satisfy Governor Phillip's anxiety about the indorsement and organization of the A. R. C. by the War Department. The letter is from Brigadier-General Albert L. Mills, U. S. A., General Staff, Chief of the Division of Militia Affairs.

"October 1, 1915.

"'Mr. G. T. Biedbeutel,
"'New York City.
"'Dear Sir:—

"'Replying to your letter of the 28th ultimo, I beg to say that I am much interested in any plans that may be worked out for the organization of a motor transport service for war time. War nowadays is such a huge undertaking that industrial resources, as well as fighting units, must be properly organized. But in the case of the transportation service, organization will not suffice; there must also be training.

"'To appreciate the difficulties of military supply, it may be well to compare the supply service of an army of, let us say, half a million men, with a city of that number of inhabitants. Both of these aggregations of human beings require a great supply of food, the food must be cooked, water must be had, clothing and shelter must be provided, the sick must be taken care of, excreta and garbage must be sanitarily disposed of. But for these purposes, the city has railroads and trolley lines. Lacking these facilities in great part, the army throws even additional duties on its supply service by reason of the need for great quantities of ammunition and equipment, and because the sick and wounded must be removed. Moreover, these facilities must never block the roads needed for the tactical movement of troops.

"'The field, ammunition, supply, sanitary, and engineer trains pertaining to a tactical division of 22,000 men, occupy 5.1 miles of road space. In addition there are great trains not assigned to divisions. The handling of these trains so as to avoid hopeless confusion is an operation calling for great skill. It cannot be satisfactorily solved unless the personnel of the trains has both experience and discipline.

"'Official Bulletin No. 2, War Department, October, 1914, says:

"'"The difficulties of supply are continuous. Incessant practice in peace is vital if supply service is to operate successfully in war."

"'Training of a supply service must be preceded by organization of the supply personnel and listing of available vehicles. The next step should be the employment of units so organized in connection with annual manoeuvers of the Regular Army and Organized Militia, and those manoeuvers should be on a larger scale than anything heretofore attempted in the United States.

"'I am heartily in sympathy with your plan to induce motorists to organize for duty in connection with the service of supply in time of war. These motorists with their cars, or as drivers of other cars to be mobilized in time of war, may render most valuable service. At present, they are an undeveloped military asset. Organization will, it is hoped, prove the first step toward development.

"'Very sincerely yours,
"'(Signed) S. L. Mills,
"'Brigadier General, General Staff, Chief, Division of Militia Affairs.'

"The next Governor we will quote from is George W. Hays of Arkansas, who writes, 'I am just in receipt of yours of the 4th and note what you say with reference to the organization throughout the United States of an Automobile Reserve Corps. I heartily indorse this move and would be glad to urge the citizens of the State of Arkansas to lend every possible assistance.'

"Governor John B. Kendrick of Wyoming writes, 'I am convinced that the automobile is shown to be a very necessary adjunct in connection with modern warfare. I have no doubt but what the organization of a Volunteer Automobile Corps will become a very necessary part of our organized militia and I am confident that the plan will appeal to all the states in the Union.'

"Governor Emmet D. Boyle of Nevada says, 'I give my unqualified approval to your proposition to organize an Automobile Reserve Corps in America. I have no doubt that the motorists of this state will gladly pledge themselves to place their cars at the service of the nation in case of war. You can call on me to assist in every possible way.'

"The Adjutant General, writing for the Governor of Georgia, says, 'An Automobile Reserve Corps would be to my mind a most valuable adjunct to the authorized organization supply trains, and as a quick means of transportation for mobile troops.'

"It is in the present plan to ask states to exempt motorists in the A. R. C. from state license fees. The reason for this is not only to partly compensate them for the use of their cars but also to supply a value received which will bind them to supply their cars when the militia is in active service or to be subject to a fine sufficiently large to pay for the rental of a substitute car. Anyone who has had any experience with National Guard organizations will appreciate the wisdom of this provision for a fine for delinquency. Many are quick to join a patriotic movement who will lag behind when the time comes for actual sacrifice.

"The A. R. C. will have a special insignia which entitle it to right of way universally during time of active service. Repair squads for the A. R. C. should be provided by the state. Motorists enlisting, with cars, in the A. R. C. should have a rank, placing them above privates. Substitute drivers, without cars, should be permitted to enlist as privates. Machinists would enlist as machinists.

"Our position in this is solely as directors of exploitation as it has not been conceived as advertising propaganda for Motor Print magazine. In this connection, I might say that the cause is espoused as vigorously in *Motor Age*, *The Automobile*, THE COMMERCIAL VEHICLE, and *Motor World* as in *Motor Print*"

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# Men and Makers

**REO MOTOR TRUCK CO.**, Lansing, Mich., has completed the foundation work on its new factory building. Work is now being rushed on the placing of the new steel-sash windows and the erection of the walls. The new structure will be one story in height, 667 by 250 feet. According to R. H. Scott, vice president and general manager of the Reo company, it has not yet been decided whether the present truck plant on north Grand avenue will be discontinued when the new building is completed or whether both will be operated.

**Federal Motor Truck Co.**, Detroit, is making plans to double the size of its plant for the second time since entering the present buildings in order to be able to keep all of the business which is now being turned away because of lack of facilities to handle it.

**Four Wheel Drive Auto Co.**, Clintonville, Wis., has been forced to enlarge its plant and add new equipment. A new stockroom, 46 by 120 feet, is now built and a number of new heavy-duty turret lathes, milling machines, boring bars and drill presses are being installed. A new machine shop section, 54 by 120 feet, will also be built. A new structure for heat-treating and tempering pupposes, 20 by 40 feet, has been completed and will be equipped with large furnaces and electric pyrometers. A structure for the storage of oils, grease and paints has also been completed. That building is isolated from the other units of the plant and is of steel and concrete.

**Commerce Motor Car Co.**, Detroit, is now running its factory 24 hours a day in order to keep pace with greatly-increased orders for its 1,500-pound light delivery trucks. The company only recently moved into its new factory addition having about 50,000 square feet of floor space, but even this was insufficient to handle the business increase without all-night work.

**Garford Motor Truck Co.**, Lima, O., has recently opened a new branch in Chicago, located in the building formerly occupied by the Jeffery distributors at the corner of Twenty-third street and Indiana avenue. The new branch will be under the management of G. A. Crane, who has sold Garford trucks in Chicago for the Overland Motor Co., which has handled the Garford line in that territory since the Lima concern was taken over by its present management. In addition to the salesroom and business offices, the new Garford branch is equipped with the most up-to-date facilities for giving Garford owners the best technical attention. The structure is practically new, having been built less than 1 year ago. It is made of brick, steel and concrete and is fireproof throughout.

**Crowther Motor Co.**, Rochester, N. Y., is rushing the work on its new plant being erected in that city at Ridgway and Woodrow avenues. The first unit of what is ultimately to be a large plant is 145 by 150 feet, with a concrete shipping platform 20 feet wide. It is expected that the first building will be ready for occupancy by December 1, next. The Crowther company will manufacture a light delivery vehicle featuring the friction drive developed by C. E. Duryea and in addition will make two models of low-priced passenger cars.

**Studebaker Corp., Detroit**, has just opened a factory branch at Saginaw, Mich., located at 521-523 Genesee avenue. The building has been remodeled into a modern salesroom and will be operated in connection with a garage and service station. The new branch is in charge of J. C. Andrews, who has been in the employ of the Studebaker concern for several years.

**Continental Motor Mfg. Co.**, Detroit, has begun work on the construction of the new drop forge building at the Muskegon, Mich., plant of the company. An additional structure, 60 by 180 feet, will be erected on half of a recently-purchased

Rookies learning the business of war under the direction of army officers at the preparedness encampment for men in civil life at Ft. Sheridan, just outside of Chicago, used the Kelly truck shown above for hauling provisions to the camp for the entire contingent. As may be noted, the truck is equipped with the conventional type of army transport body with tarpaulin top on take-down semi-circular supports as used by the United States Army and those of the foreign countries now at war. The truck was loaned by the Kelly-Springfield Motor Truck Co., Springfield, O., and was equipped with Firestone tires. It is shown on one of the company streets with the tents in the background

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Forty-eight tons, gross weight, is the total load being hauled by the new Knox four-wheeler shown above. The load is carried on one semi-trailer, the front end of which is supported on the tractor, and on six steel-tired four-wheeled trailers, each carrying a steel tank filled with oil to be used in road construction work. The tractor pulled this load from Cleveland, O., to Cook road, Lorain County, a distance of 30 miles, in 6 hours, including the time of coupling and uncoupling. This was an average running time of 5 miles per hour

site fronting on Muskegon lake, the other half of the plot being reserved for future building operations.

**Studebaker Pasadena, Cal., Branch** is to have an additional wing added to the present quarters. The addition provides accommodation for a garage to front on two streets and having an entrance through a runway from a third street.

**Waukesha Motor Co.,** Waukesha, Wis., manufacturer of motor vehicle gasoline motors, now has several new buildings under construction. These include a new power and heating plant, 44 by 66 feet, and a new shop, 88 by 220 feet, for assembly purposes and for finished stock.

**Gemmer Mfg. Co.,** Detroit, manufacturer of motor vehicle steering gears, has prepared plans for the erection of an additional one-story structure to be 40 by 60 feet.

**Hess-Bright Mfg. Co.,** Philadelphia, Pa., recently awarded a contract for the erection of a one-story factory addition, 40 by 60 feet, at Front street and Erie avenue, to cost $3,980.

**Toledo Machine & Tool Co.,** Toledo, O., will soon start the construction of a three-story addition, 400 by 100 feet, of steel, brick and concrete, which will cost approximately $200,000. The new structure will increase the capacity of the plant 35 per cent.

**Atlas Drop Forge Co.,** Lansing, Mich., will enlarge its plant considerably in order to meet the requirements of increased business, the stockholders of the company having approved of a contemplated expenditure of between $40,000 and $50,000 for that purpose. The present force of 140 men will be doubled as soon as the new additions to the plant are completed. A 10 per cent cash dividend was declared on the company's capital stock of $200,000 at a recent meeting of the stockholders.

**Van Sicklen Co.,** Aurora, Ill., maker of the Van Sicklen speedometer, has opened a branch office and service station at 1255 Woodward avenue, Detroit. C. P. Van Sicklen, son of N. H. Van Sicklen, president of the company, has been placed in charge. The Van Sicklen company has also secured the service of Otto Von Bachelle, consulting engineer, who will be located in the Detroit territory. Because of opening its Detroit branch the Van Sicklen company has severed its connections with the Cutting, Armstrong & Smith Sales Co.

**New Willard Service Stations** have recently been established by the Willard Storage Battery Co., Cleveland, O., as follows: Edward E. North, Warren, O.; E. B. Vivian, Monroe, Mich.; The Sleeper Co., Fowler, Ind.; Oriental Auto Co., Chanute, Kan.; Meredith Battery Service Station, Springfield, Mo.; Iowa Battery Service Station, Hampton, Ia.; and the Lebanon Storage Battery & Magneto Co., Lebanon, Pa.

**Electric Auto-Lite Co.,** Toledo, O., has recently broken ground for the erection of a $74,000 addition to its Champlain street plant. It will be 385 by 103 feet, of concrete and steel construction. It will be three stories in height with provision made for a fourth story if future demands require it.

**Hartford Auto Tire Pump Co.,** Hartford, Wis., has revised its plans for its new factory and garage to just double the space originally planned. The building will be of reinforced concrete and hollow tile, 55 by 88 feet, two stories high with a basement. Work on it is now under way.

**Firestone Tire & Rubber Co.,** Akron, O., last week placed contracts for the erection of additional plant buildings which provide floor space amounting to 110,000 square feet, or nearly 3 acres. The new buildings are in addition to the five wings started last spring and which are now nearing completion. When the new additions are erected and those now under construction are completed, the total floor space of the entire plant will be over 31 acres, of which 10 acres have been added this year.

**H. C. White,** formerly superintendent of the assembling departments of the Pierce-Arrow Motor Car Co., Buffalo, N. Y., has recently become production engineer for the Curtis Aeroplane Co., in the same city.

**Republic Rubber Co.,** Youngstown, O., has recently made several changes in its working organization. L. T. Peterson, first vice president of the company, takes charge of all the factory operations; A. H. Harris will occupy the position of manager of works, and W. D. Harris will have charge of all of the tire departments. During the month of September last the company's tire output was more than three times that of the same month of the year previous. The production during the present October has exceeded that at any other time in the history of the company.

**James G. Shelley,** inspector of motor trucks for the Packard Motor Car Co., Detroit, has just returned to the Packard plant after a year spent in Petrograd, where he was engaged in giving the finishing touches to the Packard trucks sold to the Russian government before they participated actively in the European war. While Mr. Shelley's services were all performed at the government's motor transport base and not on the firing line, he nevertheless had an exceptional opportunity to study the performances of American-made trucks in war service. He states that American-made trucks have made an enviable record for themselves by their excellent performances under the most severe conditions and that this showing will bear tremendous results after the war is ended. Fred Schaefer another Packard employe with Mr. Shelley will return from Petrograd in 2 months.

**B. C. Day,** formerly at the New City headquarters of the Packard Motor Car Co. of New York, has been promoted to the position of branch manager of the company at Buffalo, N. Y. T. P. Meyers, also of the Gotham branch, accompanied Mr. Day to Buffalo, where he will become manager of the truck sales department.

**Lee J. Eastman,** formerly assistant to E. B. Jackson when the latter was manager of the Packard branch in Philadelphia, Pa., has been appointed manager for the same concern, the Packard Motor Car Co. of Philadelphia. Mr. Eastman had been acting manager of the branch since the removal of Mr. Jackson to New York City as president of the New York company.

**L. F. Stevens** has succeeded R. M. Fisher as manager of the Chase Motor Truck Sales Co., Chicago, the exclusive Chase dealer in that territory. Mr. Stevens has been selling motor trucks of various makes in Chicago for the past 12 years and so goes to the Chase company with considerable experience.

**Bryce E. Blackley,** manager of the motor truck department of the J. C. Tucker Co., Providence, R. I., for the past year,

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joined the staff of H. T. Boulden, general sales manager of the Chase Motor Truck Co., Syracuse, N. Y., as division sales manager for the Chase company in the New England territory, with offices at Providence.

**Frederick Liser** has been appointed a special assistant in sales work to G. A. Crane, manager of the new Chicago branch of the Garford Motor Truck Co., Lima, O. He was formerly identified with the organization of the Chicago branch of the International Motor Co., New York City.

**C. E. Golder** has been appointed assistant manager in charge of sales at the new Chicago branch of the Garford Motor Truck Co., Lima, O. He was formerly connected with the Curtis Automobile Co. and the Kissel Motor Car Co., Hartford, Wis.

**J. C. Philpott,** formerly superintendent of the truck service department of the Overland Motor Car, Chicago, has accepted a position of similar capacity with the new Chicago branch of the Garford Motor Truck Co., located at Twenty-third street and Indiana avenue.

**R. S. Hurd** has recently been appointed manager of the new branch of the White Co., Cleveland, O., at Portland, Ore.

**J. D. Bowen** has recently been appointed factory representative for the Republic Motor Truck Co., Alma, Mich., to cover the states of Florida and Georgia. He makes his headquarters at 14½ south Laurel street, Jacksonville, Fla.

**J. R. Cooper,** formerly factory representative of the Willys-Overland Co. at Kansas City, Mo., has been made manager of the truck department of the same company at Topeka, Kan.

**H. R. Voit** has recently been made director of purchases for the Continental Motor Mfg. Co., Detroit, and will have charge of all purchases for both the Detroit and Muskegon plants of the company. Mr. Voit was formerly purchasing agent at the Oakland Motor Car Co., Pontiac, Mich.

**Ralph Brown** is now a member of the engineering force of the Perfection Spring Co., Detroit. He was formerly chief engineer of the Keeton Motor Car Co., the American Voiturette Co., and later a member of the engineering organization of the Hupp Motor Car Co.

**V. A. Bartow,** formerly in charge of the Bosch service station in San Francisco, Cal., will shortly assume charge of the Spokane, Wash., service station of the Child, Day & Churchill Co.

**George H. Hunt,** formerly with the Stromberg Motor Devices Co., Chicago, has been appointed manager of the Detroit offices of the same company.

**W. A. Westlake,** formerly with the New York City branch of the Goodyear Tire & Rubber Co., Akron, O., has recently become identified with the Ajax-Grieb Rubber Co., Inc., at 316 north Broad street, Philadelphia, Pa.

**S. M. Beatty,** formerly manager of the Providence, R. I., branch of the Goodyear Tire & Rubber Co., Akron, O., has been transferred to a position in the sales promotion department of the company at the Akron plant. He is succeeded at Providence by E. J. Smith, who was previously manager of the company's branch in Hartford, Conn.

**C. H. Minto** has been appointed manager of the San Francisco, Cal., factory branch of the Gibney Tire & Rubber Co., Conshohocken, Pa. He will have complete charge of the Gibney business along the Pacific coast.

**Firestone Sales Convention,** which was held at the Akron, O., plant of the Firestone Tire & Rubber Co., on September 29 and 30, was attended by 500 salesmen, who came from every state in the Union and from six foreign countries. General conferences were held each day. These were addressed by the Firestone executives, branch managers and salesmen, who spoke on the various types of tires and rims and the questions of experts, adjustments, credits, and factory and branch efficiency. Each salesman also spent some time in the factory where he studied the detailed construction of Firestone tires from every angle. According to Firestone officials the convention was the biggest and most successful ever held by the company.

**Detroit Steel Products Co.'s Banquet,** which was held in one of the private dining rooms of the Detroit Athletic Club on September 19 to celebrate a record-breaking amount of business done by the company during September last, was attended by thirty members of the concern as the guests of general manager J. G. Rumney. The mechanical output of Detroit self-lubricated springs was the largest in the history of the company. Speeches were made at the banquet by Walter S. Russel, president of the Russel Wheel & Foundry Co., Detroit, and by R. S. Drummond, vice president of the Detroit Steel Products company.

**"Mack Trucks in War Maneuvers"** is the title of an attractively-arranged forty-page booklet just published by the International Motor Co., New York City, and which describes and pictures in detail the work which Mack trucks did at the business men's encampment at Plattsburg, N. Y. The book is of especial interest at just this time, when the talk of preparedness is on every one's lips, because of the fact that motor trucks handled all of the transport for the 1,300 rookies at the camp as well as all the incoming food for the 3,700 regulars. Two Mack trucks took part in the army maneuvers, one a 3½-tonner and the other a 1-ton unit, both of which made the trip from New York City to Plattsburg, a distance of 354 miles. The book is well illustrated with views of the trucks on the march and at camp and contains in addition to a reprint from THE COMMERCIAL VEHICLE of September 1, 1915, on the first three pages, numerous daily reports of the drivers in charge of the trucks and letters of commendation as to the truck performance from officers in charge of the transport. The small Mack was used as a transport wagon while the big 3½-tonner was fitted with side armor and hauled a standard United States 3-inch field piece with limber. A complete log of the trip for both of the trucks is also given.

**"The Kant Slip"** is the title of the new house organ of the Kelly-Springfield Tire Co., New York City, the first issue of which, dated October, is just off the press. It will be published monthly and will contain news of interest to Kelly-Springfield dealers or users of Kelly-Springfield tires. The initial issue consists of fourteen pages, besides covers, containing information of interest to tire users in general and news of the Kelly-Springfield company and its men in particular. A special department is called "Technical Talks." This is a clearing house of information pertaining to both pneumatic and solid tires. Letters on tire questions addressed to the technical editor of the department will be answered in the organ from month to month. The October issue is printed on white paper, 9 by 11, and is attractively illustrated.

**Trucks Imported by British South Africa** in 1914 from other parts of the world were valued at $112,177, of which $71,143 worth came from the United Kingdom and the remainder, $41,643 worth, from the United States. The 1915 imports were $29,705 less than in the year previous, 1913, this being due to war conditions in Europe. In 1913, the trucks imported from the United Kingdom were valued at $116,806 and those from the United States at $25,676. From these figures it is significant to note that while the imports from the United Kingdom were $45,663 less, those from the United States were $15,958 more.

**Government Contract Regulations** covering the purchase of miscellaneous supplies for the executive departments and other government establishments in Washington, have been somewhat changed, according to Circular No. 3, just issued by the Treasury Department. The duties of the General Supply Committee and the superintendent of supplies are defined in the new rules, as well as the details which must be carried out in preparing the annual schedules of goods to be purchased and the manner in which the bids shall be obtained. Copies of the circular may be secured from the General Supply Committee, Washington, D. C.

## Commercial Motor Vehicle Agencies Recently Established Throughout the Country

| | | | |
|---|---|---|---|
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| St. Johns, N. F. | Chase | Augusta, Ga. | Republic |
| New York City | Chase | Daytona, Fla. | Republic |
| Ashton, Ill. | Kisselkar | Jacksonville, Fla. | Republic |
| Berlin, Neb. | Kisselkar | Miami, Fla. | Republic |
| Decatur, Ill. | Kisselkar | Pensacola, Fla. | Republic |
| Galesburg, Ill. | Kisselkar | Savannah, Ga. | Republic |
| Groveland, Mass. | Kisselkar | Tampa, Fla. | Republic |
| Lamar, Col. | Kisselkar | Thomasville, Ga. | Republic |
| Newburg, Ia. | Kisselkar | Fort Worth, Tex. | Studebaker |
| Paxton, Ill. | Kisselkar | Amarillo, Tex. | Wichita |
| Peru, Ill. | Kisselkar | Enid, Okla. | Wichita |
| Petersburg, Ill. | Kisselkar | Galveston, Tex. | Wichita |
| Sacramento, Cal. | Kisselkar | New Orleans, La. | Wichita |
| Taylorville, Ill. | Kisselkar | Oklahoma City, Okla. | Wichita |
| Two Rivers, Wis. | Kisselkar | Shreveport, La. | Wichita |

| | | | |
|---|---|---|---|
| Chase | Markt & Hammacher Co. | Republic | Mark Nabors & Co. |
| Chase | R. R. Silverlock | Republic | Lombard Iron Wks. & Supply Co. |
| Chase | Herzer Bros. | Republic | S. R. Green |
| Kisselkar | M. M. Billmire | Republic | H. C. Yeargain |
| Kisselkar | John Bredehoft | Republic | Hill-Dean Auto Co. |
| Kisselkar | Robert Maffit | Republic | M. M. Bird |
| Kisselkar | W. N. Powell | Republic | G. M. Williams & Co. |
| Kisselkar | Groveland Garage | Republic | D. P. Weeks |
| Kisselkar | Miller Bros. | Republic | O. F. Schlessler |
| Kisselkar | A. C. Newcomer | Studebaker | Wyatt Motor Car Co. |
| Kisselkar | Koen & Roldeen | Wichita | Samuel H. Vaughn |
| Kisselkar | Charles Keewen | Wichita | Overland Service Corp. |
| Kisselkar | J. H. West | Wichita | Interstate Automobile Co. |
| Kisselkar | Bliss & Howe | Wichita | G. F. Spence |
| Kisselkar | Charles Bradley | Wichita | Edward M. Seamons Co. |
| Kisselkar | Auto Service Co. | Wichita | Wray-Dickinson Co. |

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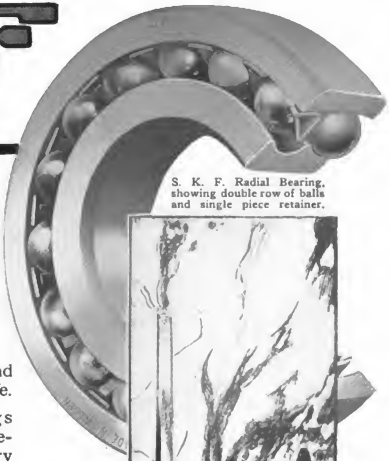
## BALL BEARINGS



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Send us your specifications. If our engineering department can help you in the matter of suggestions, don't fail to use their service.

**SKF BALL BEARING CO.**

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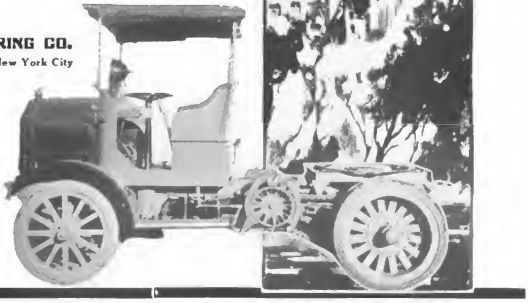



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Introducing our newest patent coal body with combined side and rear delivery. As pictured, body has gravity pitch built in. Elevates by hand 2½ feet. Load can be delivered in 4 minutes. Truck shown is 3½-ton Hurlburt. This is the most efficient and practical device we have ever built—the last word in coal body construction.

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**$1,075**

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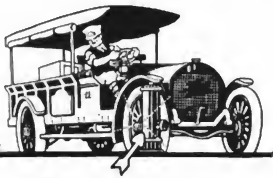

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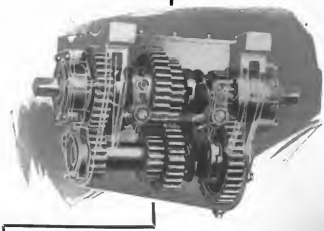

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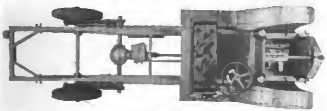

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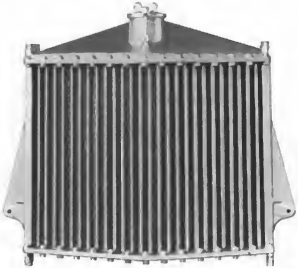

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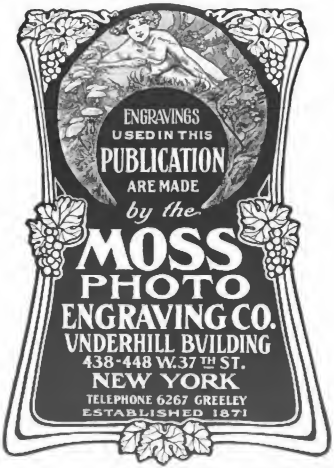
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—insures the easy and safe shifting of gears at all times, under all conditions.

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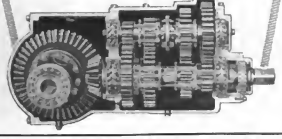

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**A Gear With a Worm and Split Nut**

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Split nut combination with trunnion gives double strength.

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*It is Lavine thoroughness which gives security*

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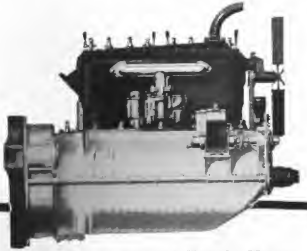

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Type TU — 4 in. bore, 6 in. stroke.
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Cylinders interchangeable.

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**Veeder Hub Odometer**

by Noticing Those Trucks Which Are Already Equipped With It

This Veeder Hub Odometer registers distance traveled backward as well as forward; there is no way to disconnect it by slipping gears out of mesh. Price, complete, $20. Special model for Ford Cars, $15.

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**Guaranteed for 8000 Miles**

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European profile contains 15% to 20% more usable rubber than others.

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Garford Trucks range from 1500 pounds to six tons in capacity.

They are designed and built by men who have spent their lives in the study of motor trucks.

They are backed by one of the strongest organizations in the industry.

Bodies are provided to meet all requirements.

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$1200

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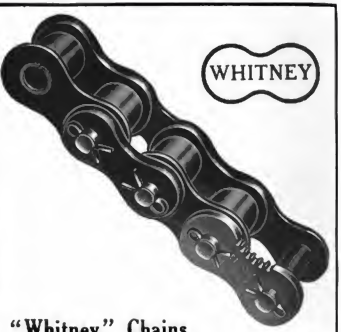


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**$975.00**

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**The complete line of trucks is as follows:**

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**Write for our Dealers Proposition**

**Bessemer Motor Truck Co., Grove City, Penna.**

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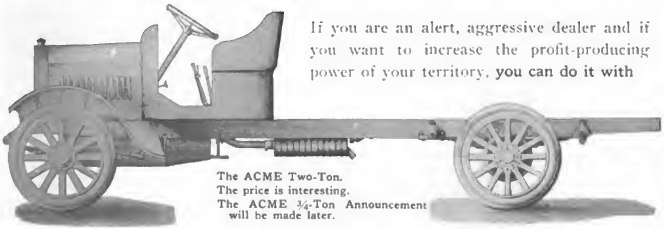

If you are an alert, aggressive dealer and if you want to increase the profit-producing power of your territory, you can do it with

The ACME Two-Ton.
The price is interesting.
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This sturdy two-ton truck is of practical design, substantially constructed and composed of the **highest grade standardized units.** Back of this truck is a strong financial organization—with permanency assured—a well defined policy in the interest of dealers and profitable dealer co-operation which will make this agency attractive.

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Continental motor with automatic speed governor
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These standard units demonstrate the class of the Acme truck

**CADILLAC AUTO TRUCK COMPANY,** 10 MITCHELL STREET CADILLAC, MICHIGAN

**INVESTIGATE NOW**

Merely sign and mail the coupon and we will afford you as a reputable dealer every opportunity for careful investigation of this agency opportunity.

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# Some International Dealer Helps

It is the policy of this Company to render every possible assistance to dealers in developing and following up prospects. This dealer service takes many forms, but it all has one object—to help our agents make sales. The folders here reproduced tell how

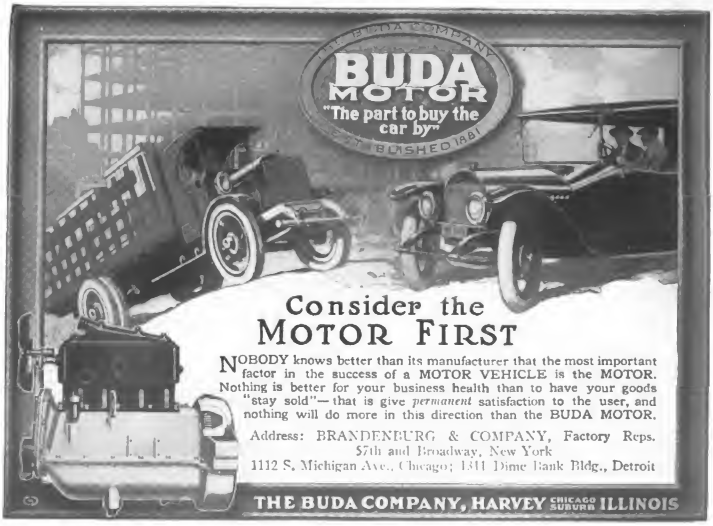
## MACK TRUCKS

have solved delivery problems for contractors, coal dealers, expressmen, and many others. This literature goes to *your prospects.*

We have some territories still open. Send for details and copies of our Dealer Helps.

INTERNATIONAL MOTOR COMPANY

64th Street and West End Avenue New York

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# The Gramm-Bernstein Truck

is in a class by itself when it comes to mechanical perfection, ease of operation, and freedom from that ever troublesome repair bill.

Figure on GRAMM-BERNSTEIN equipment and you will have the solution of your hauling problem.

GRAMM-BERNSTEIN Motor Trucks embody in their design our own wonderful non-gear-stripping transmission, worm gear rear axle and self adjusting clutch.

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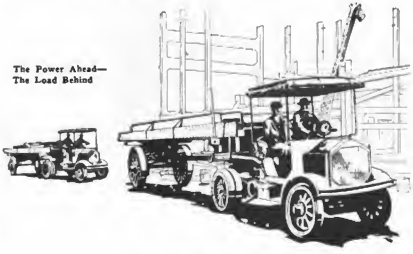
BIGGEST MOTOR TRUCK VALUE ON THE MARKET

# SAVE MONEY

## By Hauling Your Loads With a KNOX Tractor

The Power Ahead—
The Load Behind



THE Knox TRACTOR

The Knox Tractor can be the motive power for three trailers, one loading, one unloading and one moving.

The Knox does not carry and push its load like a truck—it hauls it behind. With a double set of springs, no matter what the load, the tractor mechanism does not have to support an additional pound. Flexible springs for the tractor, stiff springs for the trailer.

Any kind of a load in any kind of a wagon.

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**THE CLEVELAND-CANTON SPRING CO.**
CANTON, OHIO

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For years we have been building Watson five and seven-ton trailers for contractors and others. They have been successful. Their owners are satisfied.

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**WATSON WAGON COMPANY**
**Canastota, New York**

**Trailers for Motor Trucks and Motor Tractors**

*The World's Largest Builders of Dumping Wagons*




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## Whether It Is Glass or Gravel

on your truck you want to be sure the load is safe. Let your truck travel as fast as the law will allow and still be confident that it can be quickly and safely brought to a standstill.

**Thermoid**
**HYDRAULIC COMPRESSED**
**Brake Lining-100%**

It is the **one** brake lining that affords security to the money paid for the truck itself.

Thermoid is brake lining all the way through. It maintains its efficiency until worn as thin as this paper. Its endurance and its certainty give any truck maximum efficiency in rapidity of delivery of load and in its safety.

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# NEW DEPARTURE BALL BEARINGS

**American Made for American Trade**

THE most enlightening book ever written on this subject. It covers thoroughly the use of Ball Bearings in Automobile Trucks, Motors, Tractors, etc., and shows conclusively the economic advantages to be derived from the elimination of friction through the substitution of Ball Bearings for those of other types.

This book now on the press will be mailed free to builders, purchasing agents, and bonafide users of the apparatus mentioned if asked for on your letter head.

**THE NEW DEPARTURE MANUFACTURING CO.**
**Bristol, Conn., U. S. A.**
**Conrad Patent Licensee**

**Distributors in Trade Centers Throughout the United States**
**Sole British Agents: Brown Bros., Ltd. London and Manchester**

**For Continent of Europe:**
**Jacob Holst, Copenhagen. Freeport, Denmark**

**WESTERN BRANCH: 1016-17 FORD BLDG., DETROIT, MICH.**




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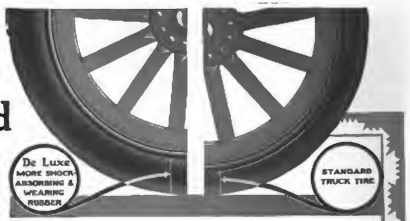
# Vibration—your truck's worst enemy—cornered at last!




Because they're *thicker*—because they put an increased volume of live, resilient, cushioning rubber *between* each rim and the road—Goodrich *De Luxe* tires *act like shock-absorbers on every wheel.*

*Vibration crystalizes steel.* It damages the truck's motor, springs, radiator, steering gear, bearings, transmission, etc.

Vibration starts at the point where tires hit bumps or holes in the road. *Stop it there!* Let the deep, thick, De Luxe tread absorb those jolts and jars right *in the rubber itself*—before shocks can rise to the truck mechanism and injure it. That's reasonable.

The result?—You will save money on repair bills—save money by keeping your truck at work for more hours—save money by *not* having your truck wear out in a few years.

Riding comfort will be improved. As it takes thicker rubber *longer* to wear down, you will get *thousands more miles* out of each De Luxe tire—and save money *again!* Because of the *extra resiliency* in De Luxe tires, your power bills will also be less.

Local Proof!—Many users of Goodrich De Luxe tires are located in *your* city—operating trucks like yours over identical roads.

Write us—*now* for their names. Ask them for their *frank* opinions Then—Make your NEXT tires

**The B. F. Goodrich Company**

Service Stations and Branches in All Principal Cities

World's Largest Rubber Factory, AKRON, OHIO

**GOODRICH DE LUXE** WIRELESS TRUCK TIRES

*"Make Rough Roads Ride Smooth"*

# A TRUCK THAT PULLS THE LOAD

The above illustration shows a Duplex Four-Wheel Drive Two-Ton Truck performing an almost unbelievable feat. A flock of sheep which, together with the trailers, weighed over twenty tons, was hauled a distance of six miles over poor country roads. Due to the extremely rugged construction of the truck and its all-four-wheel traction, the run was accomplished without difficulty.

The Duplex is the peer of any truck built for strength and general efficiency. Made in two-ton and three-ton capacity. Fully covered by patents.

***We have an attractive dealers proposition. Get in touch with us immediately.***

**THE DUPLEX-POWER CAR COMPANY**

*Manufacturers of* — Four Wheel Drive Trucks

CHARLOTTE, MICH.

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THE KREBS COMMERCIAL CAR CO. CLYDE OHIO U.S.A.

# Krebs "The Truck That Thinks"

Take two men—two laborers—of sturdy build, good physique and exceptional strength. Both are good men for hard work. They match up well and they make a good team.

But one or the other will be the better man for the brain equipment of no two men is exactly alike One may have but slightly better mentality, but that slight superiority applied to every task, to every action in the performance of the task, bulks up large in a day's work.

The same with motor trucks.

The KREBS Truck is as good as the best in its structural parts and in addition, its motor is equipped with a governor—automatic in action which gives the KREBS power plant an immense advantage over the average truck's motor.

The KREBS Automatic Governor may be set to insure a certain standard of efficiency, and when so set, prevents the driver from exceeding it. The KREBS Governor permits of a wide range of efficiency both as to speed and power. The KREBS Motor is capable of meeting every requirement in both these directions—so it remains for the owner to determine the degree of efficiency that counts for the best results—set the Governor for that result and be assured that neither the truck nor the accomplishment of the task it is put to can be jeopardized neither by adverse conditions nor thoughtless handling.

**We solicit your inquiries as to the advantages of a KREBS Equipment if your requirements call for carrying capacities between 3/4-1, 2 and 3 tons.**

## KREBS COMMERCIAL CAR CO.

**CLYDE, OHIO, U. S. A.**



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# TORBENS

## INTERNAL GEAR

PA

**Announcin**
**Model Typ**
**To**

We have e
all the impr
during yea
drive.

## NEW F

Differential housing in center of axle and divided along center line of jack shaft giving access to differential for inspection, adjustment or removal.

Quick and certain adjustment of bevel gear and pinion without dissembling any part of axle.

Bevel gear double size giving greater range of gear ratio.

No right hand or left hand parts.

Internal gear rings larger diameter and double heat treated.

*Our New Two Ton of Same Design as the Type "A" Will Be Ready February 1st*

**TORBENSEN GEAR & AXLE CO.,**




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# EN DRIVE

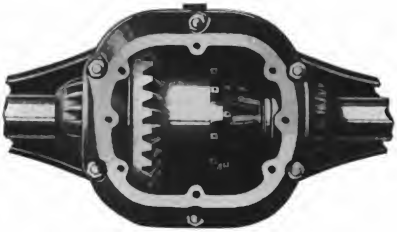
ED

## FORGED I BEAM

TRADE I MARK

**ır New ." for One- ıcks**

lied in the Type "A" rear axle nents and refinements developed experience with the internal gear



## .TURES

Grease retained in internal gears by means of shield which absolutely protects brakes.

Brakes larger and more powerful and brake rods carried inside of frame.

Jackshafts splined at both differential and pinion ends.

Bock taper bearings used on differential and drive pinion.

Strength and endurance increased with no additional weight.

***Our New One Ton Front Axle Will Be Ready for Quantity Delivery February 1st***

**Cleveland** E. 72nd St. and L. S. & M. S. R. R. **Ohio**

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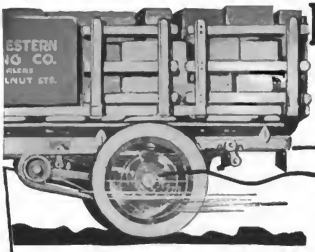

# Note the Difference In the Lines

**Body Line** **Axle Line**

THE wheels go jicketing up and down, for they've got to follow the road; but the *body* keeps to an almost perfect plane. And it's the *body* line that counts. The lines above show graphically how Detroit Springs keep the jars and jolts from reaching the vital parts of your truck.

No matter how rough the road or how heavy the load, Detroit Springs smooth out the corrugations. The driver sees a rut ahead, braces himself for a bump, when—s-w-i-s-h!—he's left it in the distance.

Detroit Springs are not "stock" springs. Every set is designed for the particular model of truck for which it is intended. Every set is virtually *built-to-order*, which enables us to guarantee them in writing for a period of two years.

Write for our free booklet "From the Ore to the Motor Car." It is a history of Detroit Springs told in interesting, instructive language. A post card will bring it.

REGISTERED Detroit Springs SILENT SELF-LUBRICATING

**Detroit Steel Products Company**
**2260 East Grand Boulevard, Detroit, Michigan**

# DETROIT

# SPRINGS



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## Four-Wheel Drive Specifications

Wheelbase—3 ton, 122 inches; 6-ton, 140 inches.

Steering—Motor power (operated by hand lever) on all wheels giving positive action to a powerful, sure, fool-proof steering device which makes a remarkably short-turning radius.

Axles—Special patented full floating.

Bearings—Rhineland.

Motor—3 tons, 4¼ x 6¼ Waukesha, 5½ x 7 Morton.

Transmission — Morton Selective 4 speeds forward, 1 reverse. Double worm drive to all wheels.

## Morton Worm Drive Specifications

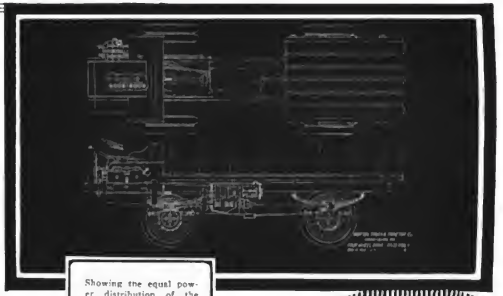
Motor—Continental—4 cyl.—4 cycle.

Carburetor—Carter.

Ignition—Bosch.

Lubrication — Positive plunger pump with constant level.

Centrifugal water pump. Hele-Shaw clutch. Selective transmission. Lever control. Right hand drive. Solid forged axles. Worm-Wheel of special phosphor bronze. All other equipment equally reliable.



Showing the equal power distribution of the Morton Four-Wheel Drive assembly

# MORTON

Four-Wheel Drive equally distributes the propelling strain over the four axles giving the highest efficiency because every pound of energy is turned into a distributed tractive effort. Morton Four-Wheel Drive Trucks in 3 to 6 ton capacity, are built to withstand the hardest usage and to mount the heaviest grades.

**Morton Worm Drive Trucks**

**1½—2—2½—3½—5 Tons**

Are the perfect vehicles of the light truck field.

## Extra Money For You

Aside from the regular truck business you can increase your earnings and the efficiency of your local fire department by interesting town officials in the finest combination hose and chemical wagon ever built.

Designed by capable engineers who provided every conceivable means for making this a dependable fire fighting unit that will **get to a fire**, regardless of the road it has to travel. The Morton Hose and Chemical Wagon is built of the best material, by the most skilled mechanics obtainable.

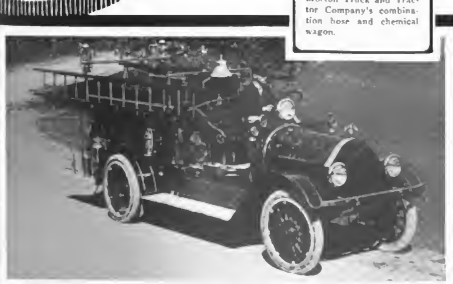
Electric starting, lighting and ignition systems are installed in such manner as to make failure to operate an impossibility. Simplicity is the keynote throughout.

Motor—Continental—6 cylinder four cycle, water cooled, 4¼ x 5¼—60 H. P. of the unit power plant type. Starting and Lighting—Iesco Combined Starting and Lighting Systems. Carburetor — Carter. Drive—Worm Gear. Brakes—service and emergency on rear wheels. Steering Gear—Irreversible type.

Guaranteed against defective workmanship or material for one year.

Equipment—2 35-gal. chemical tanks connected with by-pass, 200 ft. of ¾-in. chemical hose, 1 extension truss ladder, 1 solid side roof ladder, 2 axes, 2 bars, 8-ft. pole, 2 3-gal. hand extinguishers, acid receptacle, plug for nozzle and all tools for operating tanks and devices

Morton Truck and Tractor Company's combination hose and chemical wagon.



*Dealers—Communicate for Open Territory*

**Morton Truck & Tractor Company**

Harrisburg Pennsylvania



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# Fedders Quality

THE Fedders Policy of building radiators to the design of the manufacturer who insists upon carrying out his own ideas in every detail of equipment does not interfere with his getting Fedders Quality.

The uninterrupted patronage of the finest American truck builders and the remarkable consistency of Stutz cars in speed contests proves that Fedders Quality is a constant —a good basis to figure on, whatever the problem to be solved.

Fedders Manufacturing Co., Inc.
Buffalo - - - - New York

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# International Motor Trucks

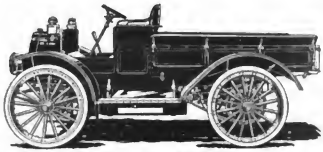
All prices quoted here are cash f.o.b. Akron, O.

## At Reduced Prices

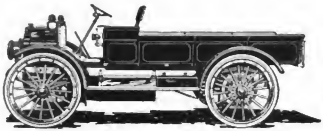
WON MEDAL OF HONOR AT SAN FRANCISCO EXPOSITION

## A Better Truck At A Lower Price

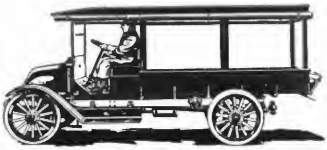
**Model MA**
1,000 pounds capacity, air-cooled..... **$600**



**Model M**
1,000 pounds capacity, water-cooled..... **$710**



**Model E**
1,500 pounds capacity, heavy duty motor..... **$950**



**Model F**
2,000 pounds capacity, chassis only..... **$1,500**

INCREASED factory production made necessary by our large 1915 sales enables us to offer regular models of International Motor Trucks at prices heretofore unheard of in the motor truck industry.

Compare the trucks shown here with any trucks of equal capacity. Buy where you find the best VALUE.

The basis of International Motor Truck success is SERVICE. We make it our business both BEFORE and AFTER a sale to see that our customers get full value for every dollar spent. That accounts for the record sales which have made necessary the construction, at Akron, Ohio, of the biggest motor truck building plant in the world.

Thirteen thousand users of International Motor Trucks testify that they are worth the old prices. At these new prices, the lowest ever made for trucks of equal quality and capacity, International Motor Trucks are far and away the best bargain in the motor truck market today. Write to the address below for full description of these trucks and complete information.

## International Harvester Company of America

**(Incorporated)**

**88 Harvester Building** **Chicago U S A**

***Agents Wanted in Unoccupied Territory. Write, 'Phone or Wire.***



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Overland
TRADE MARK REG.

DELIVERY CARS

*Prices f. o. b. Toledo.*

# You Can Use This Delivery Car To Advantage

*Quick service—dependability—economy—*

These are the things most essential in your delivery system.

Horses and wagons cannot give you these business advantages.

Your business is growing—the territory you serve is larger—your customers are more exacting.

Your competitor, with his motor delivery may be taking away your trade and your prospects.

*Quick service—dependability—economy—*

You get these absolutely in an Overland Delivery Car.

Overland delivery service not only holds your old customers—it gets new ones from your competitors.

Every day's delivery can be made on schedule. The unexpected and sometimes unreasonable demands that are made on your service can be met.

This is the superior service that wins increased sales and increased prestige.

The Overland Delivery Car has a powerful, dependable 35 horsepower motor. It is electrically lighted and started. It has high tension magneto ignition, revolving oil indicator, electric control switches on the steering column, large tires and many other advantages.

Yet it sells at the remarkably low price made possible only by our tremendous production.

Hundreds of business men in a wide variety of trades are finding the Overland Delivery Car a big paying investment. It will also pay you.

**$725**
*Open Express Delivery Car*

"Made in U. S. A."

*Write for a special delivery Car catalog. Please address Dept. 191*

**$750**
*Panel body Delivery Car*

**The Willys-Overland Company, Toledo, Ohio**

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Firestone

Continental Motors

GOODYEAR

TIMKEN

DIA CO.

KELSEY WHEEL

Ford

GEMMER MANUFACTURING COMPANY

RUSSEL MOTOR AXLE COMPANY

GRAY MOTOR CO.

SAXON

HUDSON SIX

*—another*

**FEDERAL**

# THIRTY-EIGHT

Manufacturers of Automobiles, Parts and Accessories—27 more than these famous concerns named here use

# FEDERAL MOTOR TRUCKS

This is a rare tribute to the mechanical correctness of these good trucks. With such universal endorsement by the experts of the automobile industry, you can feel sure, Mr. Business Man, that "Federalized Transportation" would be profitable for you.

Concentrating upon motor trucks only and building them to suit the special requirements of each purchaser, have added to the successful service given by the 4000 to 5000 Federals now in use in all lines of work.

*Write for our Traffic Investigation Reports in your line of industry, and for the "Blue Book of Traffic"*

## Federal Motor Truck Co.

DETROIT 122-130 Leavitt St. Address Dept. 5 MICHIGAN

Worm Drive 1½-ton, 2-ton, 3½-ton motor trucks exclusively.



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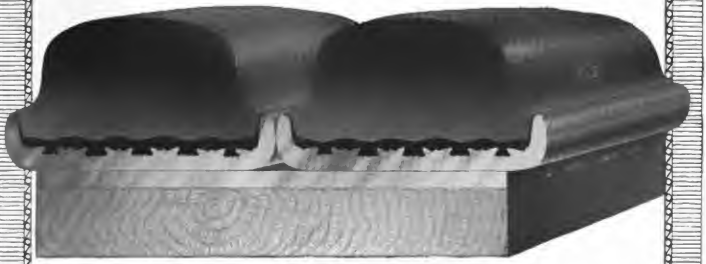
*The New*

# UNITED STATES TRUCK TIRE

**The Only Hydraulic Press of its type in the United States vulcanizes this tire under 800 Tons Pressure.**



## Extra Pressure Process

800 Tons Pressure—or about four times the pressure used to vulcanize ordinary truck tires is applied to the new United States Motor Truck Tire during vulcanization. Even the faintest traces of moisture and gas are removed from the rubber compound by this tremendous pressure. Moreover the rubber and the steel base are joined with "one-piece" strength.

This new Extra Pressure Process means an enormous increase in tire service, **but** in addition this bigger, better Truck Tire has six other vital improvements which will be described in future advertisements.

**United States Tire Company**

**Broadway at 58th Street New York City**

**Branches in all principal cities give prompt, liberal and courteous service**



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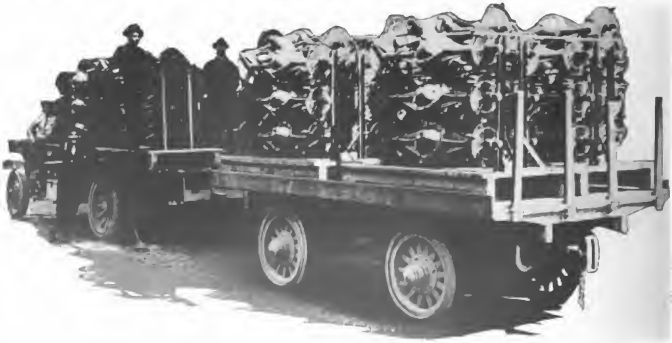
# The Studebaker Corporation were skeptical about

# Troy Trailers

The principle looked too simple. The saving looked too big. But they investigated. The result is pictured below—for, after investigation, they purchased TROYS. So did the Cadillac Motor Car Co. and the Saxon Motor Car Co. and the Ford Company. These concerns and many others are now making trucks pay the TROY way. Will you investigate? You have simply to write us for catalog 4CV. We promise you frank advice.

**THE TROY WAGON WORKS COMPANY, Troy, Miami County, Ohio**

New York 50 Church St. | Detroit 113 First St. | Washington, D. C. 505 Riggs Bldg. | Philadelphia 206 Bailey Bldg. | St. Paul 331 Amer. Nat'l Bank Bldg. | London, Eng. 49 Pall Mall



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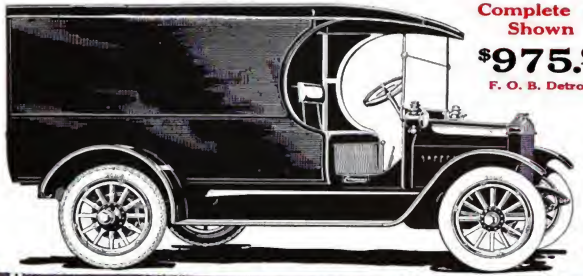

**Complete as Shown**

**$975.00**

**F. O. B. Detroit**

# A REAL DELIVERY TRUCK

To build up a successful business you live dealers know that you must have a selling proposition that will so thoroughly meet the conditions which in the first place impel your prospect to look to the motor truck for help, that your sales are really half made by your customer.

The COMMERCE Line for 1916 so thoroughly meets these conditions that no wide-awake dealer can afford to overlook it.

Series "N"—the new COMMERCE Models—comprises a line of 1500-lb. Delivery Trucks especially adapted to the needs of grocers, department stores, hardware dealers, plumbers, baggagemen, etc., who require a light, efficient truck whose initial cost and upkeep will not be excessive.

**Commerce TRUCKS**

**CHOICE OF THREE TYPES OF BODIES**

**$975.00**

*Complete, f. o. b. Detroit*

The COMMERCE MOTOR CAR COMPANY for the past six years have specialized on this one type of truck and the results of their successful past is embodied in every part of the Series "N" design.

**Summarized List of Specifications**

- Capacity, 1500 lbs.
- Wheelbase, 120 in.
- Tires, 34 x 4, non-skid rear. Demountable rims.
- Speed, maximum—25 miles per hour.
- Continental Motor.
- Waterproof Eisemann Magneto.
- Unit Power Plant.
- Finned Cast Tank Radiator.
- Brakes, 16 in. diameter.

Chassis furnished complete with Windshield, Hood, Fenders, Running Boards, Gasoline Tank, Dust Shields and Lamp Equipment, Tools, Pump, Jack and Tire Outfit, $875.00 F. O. B. Detroit.

MODEL "NC" with ample body of ash framing with steel panels. Handsomely finished in dark green and striping. Loading space, 7 feet long—44 inches wide—54½ inches high. All storm curtains. Designed for the grocer, department store and general trade where a high class body of the enclosed type is required. Rear doors or tail gate optional.

**Price, $975.00 Complete, F. O. B. Detroit**

MODEL "NH" with standing top and complete set of rolled waterproof curtains. Can readily be loaded and unloaded from the sides, saving time. Same loading space as above.

**Price, $975.00 Complete, F. O. B. Detroit**

MODEL "NA"—Open express type with flare boards, driver's top, storm curtains and tail gate. For quick delivery service.

**Price, $975.00 Complete, F. O. B. Detroit**

## Commerce Motor Car Company

**Detroit, Michigan, U. S. A.**



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COVERT

# TRANSMISSIONS

The name COVERT is an assurance of service and satisfaction. It stands for quality. It represents efficiency. It signifies simplicity of construction. It assures durability. It indicates the greatest transmission value. It means economy in assembling and of operation. It's the name that will help sell your product.

We make transmissions for all types of pleasure cars and trucks. Consult our engineers concerning your requirements.

**Covert Motor Vehicle Company**

Factory: Lockport, N. Y. | Sales Office: Detroit, Mich.



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# Who Sold The Trucks

The following advertisement recently appeared in the classified section of a big city newspaper, and is typical of other advertisements being printed daily in every city of the country. Are you a part of this new business?

**HORSES**

The Tom S. Johnson Co. horses must be sold in ten days, having installed autos; if you want a good iron-clad horse here's your opportunity; every horse guaranteed; can be seen all day Sunday or between 2 and 5 week days at Livery, 821 Adams Ave., N. E.

## Motor Trucks

Base your standard of commercial car efficiency upon Chase Motor Trucks. Dealers everywhere are sharing in the Chase demand. Thomas Edison recently remarked, "the horse must go!" The year 1916 will be the biggest in truck history. Become a working factor in this prosperity.

Adopt Chase!

**Water Cooled Motor**
**Extra Heavy Frame**

**Worm Drive**
**Unit Power Plant**

*Ask us to place your name on our mailing list for* ***"Chase'em"*** *a newsy monthly magazine worth while. Also write for literature.*

## Chase Motor Truck Company

**102 West Street** **Syracuse, N. Y.**

***"Chase Your Delivery"***



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# Stewart Quality Trucks

## New Stewart Models—New Prices

Two new models with Stewart quality in every inch and pound of their construction—and offered at ***startling new prices***—these make up the new Stewart line.

The new ¾-ton Stewart is priced at $1290. Equipped with pneumatic tires; solid rubber tires optional.

The new 1¼-ton Stewart is priced at $1390. Equipped with solid rubber tires; pneumatic tires optional.

In 90 lines of business in 137 cities—in the United States, Canada, South America — Stewart trucks are serving and saving for hundreds of owners—operating efficiently and economically—covering 25,000 to 30,000 miles without being overhauled — averaging only $1.50 per year for repair parts.

With the addition of the 1¼-ton model, Stewart trucks can now serve the needs of even more lines of business. Bus operators, farmers, light carting concerns and many others will find this new 1¼-ton Stewart ideal.

In every detail the new Stewart Quality Trucks embody absolutely the best practices in motor truck design. Every unit is of thoroughly high value. Better materials than Stewart Quality Trucks use cannot be obtained.

And then—remember that Stewart Trucks are built by a company that in three years has produced hundreds of quality trucks now in use by concerns of national prominence—such companies as the Bell Telephone Company, Coca Cola Company, and scores of other firms as well known. Furthermore, Stewart owners repeat—buy *more and more* Stewart trucks all the time.

Write for descriptive literature with further information about the new Stewart Quality Trucks. *it now.*

**STEWART MOTOR CORPORATION, Buffalo, N. Y.**



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# The Stewart Opportunity

## Wanted—125 More Dealers—New Scale of Discounts

Never before have the money-making possibilities for dealers selling motor trucks been as big as they now are. Everything points to by far the greatest year in all motor truck history.

The truck industry really enters a new era. Builders of good trucks are going to become stronger. Live dealers are going to make a lot more money.

What are the signs, you ask? The warring nations, by using thousands of American trucks, are furnishing an object lesson to American merchants. The U. S. War and Postoffice Departments are giving up horses and using trucks. The price of horse flesh and horse feed has advanced. 35,000 horses a month are going out of this country.

Men in all lines of business are now convinced that the motor truck has come to stay.

Lower prices—bigger value—can only be possible in Stewart Quality Trucks by reason of greatly increased production. After three years of rapid growth and expansion the Stewart Motor Corporation now offers the best proposition to dealers, all things considered, that has ever been extended by any motor truck builder.

We need 125 more dealers at this time to take care of our widespread output. We want live, aggressive men who appreciate fully the wonderful future of the motor truck business and the opportunity offered by Stewart Quality Trucks.

To attract live, aggressive dealers we are willing to pay a premium—in the form of more liberal discounts than ever before.

The new Stewarts will prove fast sellers and money makers for you. Write us about territory. *Do it today.*

**STEWART MOTOR CORPORATION, Buffalo, N. Y.**

(18)



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# "The Spring Is the Thing"

## MATHER

Scientifically Heat-Treated

## SPRINGS

designed to insure

## Maximum of Elasticity and Endurance

with

## Minimum of Vibration

Genuine made only by

## The Mather Spring Company

Toledo, Ohio




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# Hess-Bright's Adjudicated Conrad Patents Cover the Inimitable Bearing

***To the Trade:***

You have been advised of the broad decisions rendered by the United States Courts in sustaining Hess-Bright's Conrad patents, and it affords us much pleasure to further inform you that the principal ball bearing manufacturers of this country have frankly admitted the validity and basic scope of our patents and have entered into permanent license contracts with us.

A CONRAD PATENT LICENSEE IS A HESS-BRIGHT LICENSEE, therefore it naturally follows that, next to receiving your ball bearing business for our own concern, we are pleased to recommend our fully authorized Licensees, the STANDARD ROLLER BEARING COMPANY, Philadelphia, THE NEW DEPARTURE MANUFACTURING COMPANY, Bristol, Conn., GURNEY BALL BEARING COMPANY, Jamestown, N. Y., and the U. S. BALL BEARING COMPANY, Chicago.

Our aim is to serve the trade in the fairest and most thorough manner possible.

THE HESS-BRIGHT MANUFACTURING COMPANY

Fred E. Bright,
President




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# Brown-Lipe Standards

NOTWITHSTANDING the fact that the output of Brown-Lipe differentials and transmissions has practically been doubled during the past few months, there has been no let up in the severity of the inspection departments.

Every part of every assembly undergoes just the same rigid inspection to-day when our orders are far beyond our capacity as it would if we were running at half capacity.

This in spite of the fact that our output could be still further greatly increased if we were to let down to a scarcely noticeable extent in the severity of our inspection.

But we have clung steadfastly to our ideal of turning out only the finest quality products that could be produced, and there is a source of considerable satisfaction to us in the knowledge that in spite of the extraordinary demands that have been made upon our organizations we have maintained the high quality of our output throughout and resisted the temptation to increase our shipping tonnage at the expense of the products themselves.

As we announced in a previous advertisement we will be unable to consider any further business before the first of the year, but we hope at that time to be able to accept some additional business with definite deliveries assured.

In this regard, however, one thing is certain—that the acceptance of any further business will be predicated entirely upon our ability to produce without any sacrifice of quality.

**BROWN-LIPE GEAR Co**
**TRANSMISSIONS**
**SYRACUSE, NEW YORK**
**DIFFERENTIALS**
**BROWN-LIPE-CHAPIN Co**

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CHICAGO: K. Franklin Peterson, 122 So. Michigan Ave.
DETROIT: L. D. Bolton, 2215 Dime Savings Bk. Bldg.
SAN FRANCISCO: A. H. Coates, 444 Market St.

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The COMMERCIAL VEHICLE

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## Why

Does

The COMMERCIAL VEHICLE

appear **twice** a month, when all the other motor truck publications appear only **once** monthly?

## Because

This insures the latest news to readers. The news is **all there**, and out when it is still **news.**

Readers get successive issues close enough together to keep up their interest, so that they are in **constant,** not **intermittent** touch with developments, opinions, trends and practices.

The text pages of the magazine are not too many. The reader is given late and authoritative information every 15 days instead of an accumulated mass every month. The difference is that he can get what there is of value out of the issue without becoming sated or tired.

The subscriber gets just as much matter as he can conveniently read every half month instead of more than he can digest half as often. He also gets **more each month** than he can out of a monthly.

Why no "special issues" of

The COMMERCIAL VEHICLE

Watch this space for the answer



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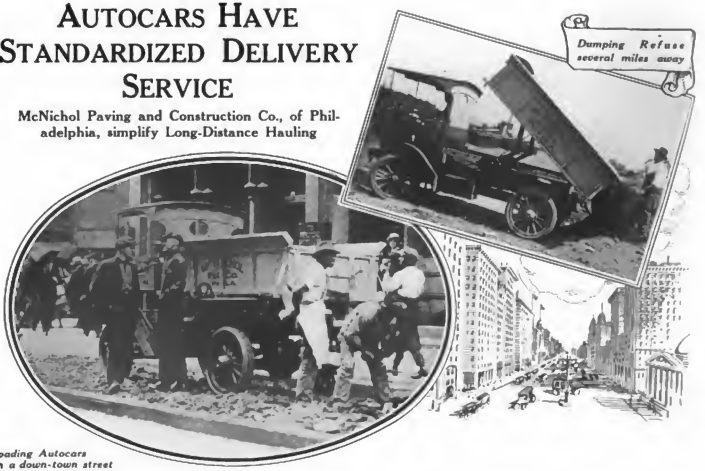
# AUTOCARS HAVE STANDARDIZED DELIVERY SERVICE

**McNichol Paving and Construction Co., of Philadelphia, simplify Long-Distance Hauling**




*Loading Autocars on a down-town street*

In the recent work of repaving Chestnut street, Philadelphia, the Autocars of the McNichol Paving and Construction Co. attracted much attention. Four cars were in use—the first two doing what it formerly took nine teams to accomplish.

These Autocars hauled both men and material—sand, cement, earth, broken asphalt, wood blocks and Belgian blocks, carrying loads over the torn-up paving, car tracks, and rough roadbed, as well as over soft dirt.

They made 12 trips each in every 10-hour day and worked double shift—both day and night. Each traveled up to 91 miles in 10 hours, and could do more but for the inability of the men to load any faster with their shovels.

Mr. McNichol was astonished by the work of the Autocars—especially as, he says, he did not consider it was possible for any truck to do what the Autocars accomplished. He has just placed an order for two more Autocars.

Autocars are used in every line of business by over 2600 concerns. Ask for a demonstration in your own business.

*Write for illustrated catalog and list of over 2600 concerns using Autocars in every line of business*

**Chassis Price, $1650**

## THE AUTOCAR COMPANY

**Ardmore, Pennsylvania**

Established 1897 MOTOR CAR DELIVERY SPECIALISTS



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The COMMERCIAL VEHICLE
Read by Business Men

Vol. XIII November 15, 1915 No. 8

# An Ideal Demountable Body Trucking Scheme

## Philadelphia Publishers and Pennsylvania Railroad Co-operate With Mutual Profit in Installing System Which Reduces Truck Loading Time

BY CO-OPERATION the Curtis Publishing Co. and the Pennsylvania Railroad have both profited by an increase in motor truck efficiency. The Curtis company, since the second week in September, has been able to handle 28,000 pounds more of outbound mail per day without additional truck equipment, while the railroad has been kept supplied with loads of mail regularly, has been relieved of all waiting for loads and has increased the efficiency of one portion of its loading and unloading platform.

The Curtis Publishing Co., the Philadelphia publisher of The Ladies' Home Journal, the Saturday Evening Post and The Country Gentleman, trucks from 10,000 to 12,000 tons of matter per month, a large portion of which is outbound printed matter forwarded over the Pennsylvania railroad. In the first 7 months of 1915 this tonnage increased an average of 1,496 tons per month, the high-water mark being reached in March when 12,063.33 tons were shipped. This increase made was mostly of supplies, the increase in ledger paper alone amounting to 1,000 tons per month.

Every ounce of this matter must be trucked over the street to and from the plant of the company at Sixth, Walnut, Seventh and Sansom streets, Philadelphia, and the railroad and steamship passenger terminals, the main warehouse of the concern, or to the post office. For this service the Curtis Co. maintains eleven vehicles out of its fleet of twelve, these being of 3½ and 5 tons capacity, and like the 7½-tonner remaining, of C. T. manufacture, electric powered.

Part of the work is the trucking of mail to the Fifteenth street terminal of the Pennsylvania railroad. Five of the vehicles, the 3½-tonners, are assigned to this work primarily and every effort is made to do as much of this work as possible with just these five. However, the work is very variable and often the whole fleet is called upon to assist the five 7,000-pounders, the volume being as variable, in fact, as the days of the week on the calendar.

### Time and Trains Wait for No Man

This haulage must be done on absolute schedule. Tuesdays and Wednesdays of all weeks and the nineteenth of every month are the heaviest days, as the schedules are so arranged that all publications are in the hands of dealers at 6 p. m. before the day or 6 a. m. of the day of distribution, in order that The Ladies' Home Journal, the Saturday Evening Post and The Country Gentleman may be in the hands of all readers, everywhere, at the same time. To reach most of the cities which consume the bulk of the copies of these publications, it is necessary to get the weekly papers out by Tuesdays and Wednesdays and the monthly before the twentieth.

Part of the City of Philadelphia, showing location of plant of Curtis Publishing Co. in relation to Broad street station and warehouse

When the first eleven trucks were installed they were ample to haul all the matter in the usual manner, each body being loaded or unloaded at each end, while the truck waited. The railroad allotted a platform at the station for the exclusive use of the Curtis trucks, this platform having a capacity for two vehicles.

When the tonnage increased, more trucks had to be provided, so that part of the day, three, four or even all of the 5-ton trucks used for the transfer of paper were impressed into the service. In the haulage of paper these trucks are provided with open platform bodies, while in postal transfer work they have stakes at the sides.

Seven loads of 4 tons each formerly constituted a 10-hour day's work for each 3½-ton machine, in spite of extra batteries to prolong the mileage. This was because the trucks were unable to load and unload rapidly enough, and so a special form of interchangeable body was designed that would fit any of the 3½- or 5-ton trucks. Overhead chain-falls were arranged at the loading platform of the plant so that these could be elevated and removed.

This permitted the bodies to be loaded while the trucks were away doing other work, as explained in THE COMMERCIAL VEHICLE of October 15, 1914, and cut the loading delay of the trucks one-sixth.

All this time, however, although the

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**LOADING MAGAZINES WITHOUT DELAY**

Illustrated by photographs taken especially for THE COMMERCIAL VEHICLE

**Top picture—Body hung from overhead beams, with iron plate in place waiting for a load**

**Middle picture — 3½-ton C. T. electric backing under same body after it has been loaded**

**Bottom picture — Same truck leaving Curtis plant less than a minute after middle view was snapped with its load of mail**

tonnage was constantly increasing, the railroad still unloaded the trucks at the same two-truck platform of the station, nor was there any prospect of increased facilities being provided, owing to the physical limitations of the passenger terminal itself.

Having had such good results with the demountable and interchangeable body at its own end, however, the Curtis firm opened negotiations with the railroad with the object of installing removable body chain-falls at the railroad platform so as to increase the efficiency of the present facilities. The railroad finally acceded.

The Curtis company installed the new scheme at its own expense and supplied the equipment. The railroad had but to permit this rigging to be installed and to continue to reserve it for the exclusive use of the Curtis concern. In a broad-minded way the officials of the railroad readily grasped the importance of providing more efficient unloading means for this shipper, and perceived the advantages accruing to the railroad as well, and on September 8, 1915, the system was inaugurated.

Previous to this move, in spite of the loading efficiency of the Curtis transportation scheme, the trucks were often kept waiting for from 30 minutes to 3 or 4 hours for a chance to unload at the Fifteenth street terminal. At present, delays have been much reduced, in spite of the fact that the trucks aim to keep one load ahead of the unloading force at the railroad end at all times.

On 1 day since the change was made four 3½-ton chassis hauled 130 tons, which is more than had ever been hauled before without the complete removable body scheme, even with the assistance of the 5-tonners. The loads ran from 7,000 to 8,000 pounds in weight.

These four trucks now do the work that would require five or more under the original scheme with fixed bodies. Six bodies are used for the five trucks, two being kept at the Pennsylvania terminal and four at the plant, except when in transit.

One man, employed by the Curtis company, is stationed at the Fifteenth street terminal every day, and on rush days two. These men keep in constant touch with the plant and see to the proper handling of the bodies and dispatching of the trucks at the railroad end.

Before the installation of the new system the four trucks took seven 8,000-pound loads each per day. Now each makes nine trips with 7,000-pound loads. This permits of 28,000 pounds gain per day. This gain represents 2,000,000 pounds per year.

The method of operation is as follows:

Starting, as the illustrations do, with the beginning of the day's work, four of the bodies are hung up at the loading platform at the plant, and all of the trucks are at the garage. Handtrucks of 1- to 1½-ton capacity, four-wheeled, are used to convey the mail bags from the post office checkers on the wrapping

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floor to the loading platform. Iron bridges between the platform edge and the tailboards of the suspended bodies permit the handtrucks to be rolled directly into the bodies and the loading to be speedily and easily accomplished.

As the bodies are loaded, trucks to haul them away are dispatched from the garage. They proceed to the warehouse, where each picks up a load of paper rolls, which it transfers to the courtyard of the main plant. The paper is taken off and ready there has been emptied, the trucks meanwhile hauling to other terminals or working on paper, incoming freight or similar work.

In case of an exceptional rush, 5-tonners may be called from their routine of paper or other hauling to assist their smaller brothers until the normal equipment is again able to cope with the volume of mail.

One more body probably will shortly be purchased, however, so that less reliance need be placed on the aid of the big trucks. In passing it is worthy of note that whereas the 5-tonners have platforms considerably larger than those of the 3½-tonners, the same bodies are used with perfect satisfaction.

The bodies cost but $165 each. It would take six trucks with fixed bodies to do the work that four with six removable bodies do, so that the arrangement saves the cost of two chassis outright, the substitute bodies totalling but $330. To this must be added the cost of the chain-falls used to raise and lower them, and tracks upon which they travel.

Two trucks would cost $9,400 with the type of steel-covered platform bodies used, and their upkeep, according to Curtis estimate, $6,000 yearly, in round figures. The entire removable body and hoist equipment cost $5,000, and including all possible charges costs about $1,100 a year, including depreciation and interest and all upkeep charges.

By this comparison it is seen that

(Continued on page 20)

the empty truck backs into the loading bay on the Sansom street front of the plant, directly under the loaded body to which it has been assigned.

When a truck is thus in position the platform men lower the body onto it and detach the supporting chains.

Arriving at the Fifteenth street terminal, the truck backs into its place and the platform men attach the chains and raise the body clear of the truck. The truck then maneuvers to a position directly beneath the other body which is empty and waiting to be trucked back to the plant. This is lowered onto the truck just as the loaded one at the plant was and the truck is once more upon its way.

Returning to the plant the empty body is lifted from the chassis and the whole process repeated, all four trucks working simultaneously if need be.

If for any reason there is delay at the railroad end, the railroad platform man informs the plant immediately and no more loads are sent to the railroad until the body al-

**WHERE TERMINAL DELAYS ARE UNKNOWN**

Continuation of specially posed series on the opposite page

**Top picture—Curtis truck arriving at Fifteenth street platform of Broad street station with its load**

**Middle picture—Body being hoisted from truck by hand chain-falls**

**Bottom picture — Loaded body waiting for railroad employes to unload it, truck on way back to plant with an empty body**

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# Motor Trucks Prominent at the P. P. I. E.

## Transportation Building Contains All Kinds of Vehicle and Railway Exhibits—Too Few Trucks for Separate Building as Planned

By John Grant

COMPETING for public interest with transportation facilities drawn together from all over the world for exhibition, the motor trucks at the Panama-Pacific International Exposition at San Francisco have shown their ability to attract and hold a fair share of the interest of hundreds of thousands who have viewed the contents of the gigantic Transportation Palace, one of the most interesting features of the great exposition facing the Golden Gate.

The Transportation Palace contains exhibits of foreign railway and steamship lines, including models of their cars, ships, maps of their territory, wax figures of their uniformed attendants, and numerous photographs; a splendid exhibit of the Pennsylvania Railroad and the empire it serves; a Westinghouse exhibit of full size electric cars and locomotives, etc. All are intensely suggestive of the vast importance of transportation in modern life and the big scale on which modern business and social affairs demand that transportation shall be conducted.

It is in this atmosphere that the gasoline and electrically propelled road vehicles draw crowds greater than all the other features of the Transportation Palace combined.

The character of the motor truck exhibits would doubtless have been considerably different if they had been located in a separate building of their own, as was once proposed. This plan, however, was not suggested until after the trucks of the present exhibitors had been located in the Transportation Palace. When the inconvenience and expense of rearrangement and adjustments was considered the plan was dropped, so now the trucks are in the motor car section, interspersed with passenger cars, and there is no particular massed effect produced by the trucks. Most of the ex-

(Continued on page 30)

Part of the Transportation building at the Panama-Pacific International Exposition, showing Walker electric booth in foreground, Four Wheel Drive in middle background, Buick and others and also heroic panoramic fresco of the Lincoln transcontinental Highway

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# Trailer Economy Makes Trucks More Efficient

## Part II

### Construction and Sizes of Trailers and Specifications of Those Models Carried in Stock

TRAILERS built for use in connection with motor vehicles differ materially from those used behind horses. These differences consist mainly of a general strengthening of parts, the use of improved wheel bearings and the fitting of rubber tires. These have been found necessary because of the greater speeds as compared to those of horses.

The tendency of design of four-wheeled trailers is to build them from the conventional truck down, rather than from the horse wagon up. As the four-wheeled trailer carries the same or a greater load than the hauling vehicle, its load-carrying parts should be of equal strength with those of the truck. In four-wheeled trailers for loads of 1 ton and more, conventional truck axles with wheels carried on roller bearings and steered by knuckles are the trend. In almost all cases drawbars are equipped with some sort of spring device to absorb the shocks in starting and stopping.

The drawbars must also permit of the trailer turning corners easily and provide for it dropping into ruts or mounting obstructions without climbing of the drawbars. Rubber tires have been found better adapted than steel ones for use on trailers of the four-wheeled type because they permit higher speeds to be maintained. Steel tires are cheaper than rubber ones, but this advantage is somewhat offset because rubber trailer tires are guaranteed for 60 per cent more mileage than truck tires.

The semi-trailer is essentially a development of the horse wagon. Steel-tired wheels are used almost universally but the wheels and springs must be of the best material and manufacture in order to stand up under the comparatively high speeds. Both roller and plain bearings are used in the wheels, although the latter type are of improved design to insure proper lubrication and to prevent them from becoming loose. Many of the fifth-wheels in use are equipped with some sort of shock-absorbing device for easy starting and stopping.

Independent two-wheeled trailers are mostly used for carrying light loads at comparatively high speeds. Requirements of this type are low price and lightness with ruggedness. Ball, roller and plain bearings with pneumatic, solid rubber and steel tires are used.

Trailers used in connection with trucks or tractors may be divided into three distinct classes, as follows:

1—The four-wheel trailer.
2—The semi-trailer.
3—The two-wheeled trailer.

These in turn may be divided into four classes, according to the work done, as follows:

1—For heavy loads above 10 tons.
2—For medium loads of 3 to 10 tons.
3—For loads from 1 to 3 tons.
4—For loads less than 1 ton for use as tenders to light vehicles.

The specifications of these various classes of trailers now carried as stock models by American manufacturers are given in the table on page 10. It will be noted that trailers of the two- and four-wheeled types comprise most of this table, the reason for this being that the great majority of semi-trailers now in use are converted horse wagons or have been made to order to suit the special conditions of service and the structural design of the tractors to haul them.

Short descriptions of each type, pointing out the features of design in each case, are given hereinafter, arranged alphabetically according to name.

### Makers of Trailers for Motor Trucks and Tractors

Bain Wagon Co., Kenosha, Wis.
*Brasie Motor Car Co., Minneapolis, Minn.
*Campbell Mfg. Co., Jackson, Mich.
*Columbia Motor Truck & Trailer Co., Kalamazoo, Mich.
*Chicago Pneumatic Tool Co., Chicago.
*Detroit Trailer Co., Detroit.
*Dunkley Co., Kalamazoo, Mich.
Eagle Wagon Wks., Auburn, N. Y.
*Laura, John F., Coldwater, Mich.
*Lion Buggy Co., Cincinnati, O.
*Miami Automobile Trailer Co., Troy, O.
Jacob Press' Sons, Chicago.
Sebastian Wagon Co., New York City.
Senderling Mfg. Co., New York City.
Shadbolt Mfg. Co., Brooklyn, N. Y.
Sherwood Bros. Mfg. Co., Canastota, N. Y.
*Simplex Short-turn Gear Co., Anderson, Ind.
Tiffin Wagon Co., Tiffin, O.
*Troy Wagon Wks. Co., Troy, O
Variety Mfg. Co., Chicago.
*Ward Motor Vehicle Co., Mount Vernon, N. Y.
*Watson Wagon Co., Canastota N. Y.

*Makers of stock models.

### Brasie

#### Pneumatic-tired Two-wheeler to Carry 400 Pounds

**Brasie Motor Car Co., Minneapolis, Minn.**

Pneumatic-tired, the one model of Brasie trailer is designed to carry 400 pounds and to be used after high-speed passenger cars or light trucks. For this reason it is very light, with a low-swung body, and wire wheels carried on ball bearings. The body is carried on two long flat semi-elliptic springs slung beneath the axle. The floor of the body, which is of the low-sided type, is 20 inches above the ground.

It is towed by a steel drawbar with a double-swivel coupler to take care of the turning when rounding a corner, when negotiating uneven ground and to allow for twisting stresses.

### Columbia

#### Non-reversible Four-wheeled 3-Tonner

**Columbia Motor Truck & Trailer Co., Pontiac, Mich.**

One model of 3-ton capacity makes up the Columbia line, which was designed to be sold in conjunction with the Columbia 2-ton truck as a truck-and-trailer combination for hauling 5-ton loads. The trailer is of the four-wheeled type and has solid rubber tires on wheels carried on roller bearings. It is non-reversible

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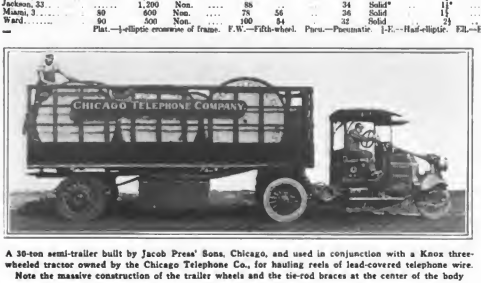
# Specifications of Stock Models of Trailers for Trucks and Tractors

| Make and Model | Price | Capacity in Pounds | Reversible or Non-Reversible | Wheel-base in Inches | Overall Length in Inches | Track in Inches | Wheel Diameter in Inches: Front | Wheel Diameter in Inches: Rear | Tires: Kind | Tires: Size in Inches: Front | Tires: Size in Inches: Rear | Springs: Kind: Front | Springs: Kind: Rear | Springs: Size in Inches: Front | Springs: Size in Inches: Rear | Type of Wheel Bearings | Load Platform in Inches: Length | Load Platform in Inches: Width | Height Above Ground |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Four-wheeled Types** | | | | | | | | | | | | | | | | | | | |
| Columbia, A. | $675 | 6,000 | Non. | 90 | 144 | 59 | 37 | 37 | Solid | 4 | 4 | ½-E. | ½-E. | 2½x52 | 2½x52 | Roller | 144 | 66 | 44 |
| Detroit, 3-ton | 650 | 6,000 | Rev. | 94 | 144 | 56 | 36 | 36 | Solid | 6 | 6 | ½-E. | ½-E. | 3 x40 | 3 x40 | Roller | 144* | ... | 45 |
| Detroit, 5-ton | 875 | 10,000 | Rev. | 94 | 144 | 56 | 36 | 36 | Solid | 6 | 6 | ½-E. | ½-E. | 3 x40 | 3 x40 | Roller | ... | ... | 45 |
| Detroit, 7-ton | 1,050 | 14,000 | Rev. | 100 | 150 | 60 | 36 | 36 | Solid | 7 | 7 | ½-E. | ½-E. | 3½x42 | 3½x42 | Roller | ... | ... | 45 |
| Miami, 1 | 125 | 1,000 | Non. | 79 | 104 | 56 | 32 | 36 | Solid | 1½ | 1½ | Plat. | Plat. | 1½x38 | 1½x38 | Roller | 96 | 38 | 26 |
| Miami, 2 | 190 | 1,000 | Non. | 79 | 104 | 56 | 32 | 36 | Solid | 1½ | 1½ | Plat. | Plat. | 1½x38 | 1½x38 | Roller | 96 | 38 | 26 |
| Simplex, C. | 85 | 1,000 | Rev. | 61 | 91 | 56* | 30 | 30 | Solid | 1 | 1 | Ell. | Ell. | 1x30 | 1x30 | Plain | 84 | 40 | 26 |
| Simplex, D. | 95 | 1,000 | Rev. | 61 | 91 | 56* | 30 | 30 | Solid | 1 | 1 | Ell. | Ell. | 1x30 | 1x30 | Plain | 84 | 40 | 26 |
| Simplex, B. | 116 | 1,200 | Rev. | 61 | 91 | 56* | 30 | 30 | Solid* | 1½* | 1½* | Ell. | Ell. | 1x30 | 1x30 | Ball | 84 | 40 | 26 |
| Signien, A. | 150* | 1,200 | Rev. | 61 | 91 | 56* | 30 | 30 | Pneu. | 2* | 2* | Ell. | Ell. | 1x30 | 1x30 | Ball | 84 | 40 | 26 |
| Troy, 110 N.R. | 464* | 3,000 | Non. | 71 | 132‡ | 56‡ | 36 | 36 | Solid* | 3 | 3 | ½-E. | ½-E. | 2½x42 | 2½x42 | Roller | 132 | 72* | 40 |
| Troy, 110 R. | 574.50* | 3,000 | Rev. | 71 | 144‡ | 56‡ | 36 | 36 | Solid* | 3 | 3 | ½-E. | ½-E. | 2½x42 | 2½x42 | Roller | 144 | 72* | 40 |
| Troy, 212 N.R. | 723.50* | 5,000 | Non. | 82 | 157‡ | 64‡ | 36 | 36 | Solid* | 4 | 4 | ½-E. | ½-E. | 3 x46 | 3 x46 | Roller | 156 | 72 | 40 |
| Troy, 212 R. | 923* | 5,000 | Rev. | 82 | 172‡ | 64‡ | 36 | 36 | Solid* | 4 | 4 | ½-E. | ½-E. | 3 x46 | 3 x46 | Roller | 168 | 72 | 40 |
| Troy, 312 N.R. | 1,127* | 10,000 | Non. | 82 | 157‡ | 64‡ | 36 | 36 | Solid* | 7 | 7 | ½-E. | ½-E. | 4 x46 | 4 x46 | Roller | 156 | 72 | 40 |
| Troy, 312 R. | 1,362.50* | 10,000 | Rev. | 82 | 172‡ | 64‡ | 36 | 36 | Solid* | 7 | 7 | ½-E. | ½-E. | 4 x46 | 4 x46 | Roller | 168 | 72 | 40 |
| Watson, 4-ton | 530.50* | 8,000 | Non. | 130 | 172 | 59 | 39 | 53 | Steel | 4x1 | 4x1 | ½-E. | Coil | 2x37½ | 1 | Roller | ... | 40.5 | ... |
| Watson, 5-ton | 725 | 10,000 | Non. | 141.5 | 197 | 60 | 39 | 53 | Steel | 4x1 | 5x1 | ½-E. | Coil | 2 x37½ | 1 | Roller | 96 | 40.5 | ... |
| **Semi-trailer Types** | | | | | | | | | | | | | | | | | | | |
| Watson, 4-ton | 450 | 8,000 | Non. | .... | 172 | 59 | .. | 53 | Steel | .. | 4x1 | .... | Coil | .... | 1 | Roller | .. | 40.5 | |
| Watson, 5-ton | 550 | 10,000 | Non. | .... | 197 | 60 | .. | 53 | Steel | .. | 5x1 | .... | Coil | .... | 1 | Roller | 96 | 40.5 | |
| **Independent Two-wheeled Types** | | | | | | | | | | | | | | | | | | | |
| Brazie | 75 | 400 | Non. | .... | 52 | 56 | .. | 28 | Pneu. | .. | 3 | .... | ½-E. | .... | —x36 | Ball | 52 | 43 | 30 |
| Detroit, T. | 75 | 1,000 | Non. | .... | 72 | 56 | .. | 30 | Solid | .. | 1½ | .... | ½-E. | .... | 1½x40 | Ball | 72 | 48 | 23 |
| Detroit, C. | 100 | 1,500 | Non. | .... | 96 | 56 | .. | 30 | Solid | .. | 1½ | .... | ½-E. | .... | 1½x42 | Roller | 96 | 46 | 23 |
| Laura | 37.50* | 1,000 | Non. | .... | 84 | .. | .. | .. | Steel* | .. | 1½x⅛ | *½-E. | Plat. | 1½x40 | 1½x38 | Plain | 84 | 40 | 18 |
| Lion | 47.50 | 1,000 | Non. | .... | 72 | 56 | .. | 34 | Solid | .. | 1½ | .... | ½-E. | .... | 1½ | Roller | 72 | 42 | 22 |
| Jackson, 24 | .... | 1,000 | Non. | .... | 84 | .. | .. | 34 | Solid* | .. | 1½* | .... | ½-E. | .... | 1½44 | Ball | 84 | 42 | .. |
| Jackson, 33 | .... | 1,200 | Non. | .... | 88 | .. | .. | 34 | Solid* | .. | 1½* | .... | ½-E. | .... | 1½42 | Ball | 88 | 42 | .. |
| Miami, 3 | 80 | 600 | Non. | .... | 78 | 56 | .. | 36 | Solid | .. | 1½ | .... | ½-E. | .... | 1½— | Roller | 78 | 36 | 25 |
| Ward | 90 | 500 | Non. | .... | 100 | 54 | .. | 32 | Solid | .. | 2½ | .... | ½-E. | .... | 1½34 | Roller | 64 | 41 | 28 |

Plat.—½-elliptic crossway of frame. F.W.—Fifth-wheel. Pneu.—Pneumatic. ½-E.—Half-elliptic. Ell.—Elliptic. *—Other options.




**A 30-ton semi-trailer built by Jacob Press' Sons, Chicago, and used in conjunction with a Knox three-wheeled tractor owned by the Chicago Telephone Co., for hauling reels of lead-covered telephone wire. Note the massive construction of the trailer wheels and the tie-rod braces at the center of the body**

and is steered through conventional steering knuckles on the front axle which are connected with the drawbar by means of tie rods.

## Detroit

### Two Light Two-wheelers and Three Heavy Four-wheeled Types

**Detroit Trailer Co., Inc., Detroit.**

Embracing a full line, Detroit trailers are now offered in five models, two two-wheeled types for loads of ½ to ¾ tons, respectively, and three four-wheeled models for 3-, 5- and 7-ton loads, respectively. Other models for loads heavier than 7 tons are also made on special order.

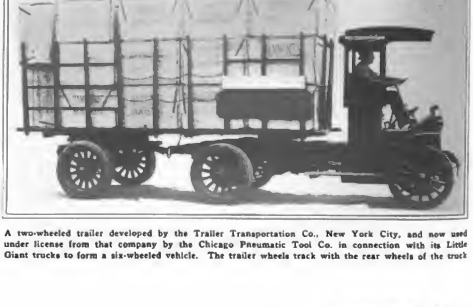
Solid rubber tires are used on all models and all three of the four-wheeled types are reversible.

Features of the design of the four-wheeled types include the use of an all-steel frame, truck type front and rear axles with truck wheels carried on roller bearings and steered by convenional steering knuckles through the rods connected with the rear end of the drawbar.

Shocks of starting and stopping are absorbed by means of a spring device generally attached to the under side of the truck frame. This consists of a steel draft bar carried in a guide block. The draft bar has washers at each end with coil springs interposed between the ends of the guide block and the washers.

In starting, the forward spring compresses and in stopping, the rear one. The rear end of the draft bar has an eye into which a bolt is dropped to connect it with the flat coupler bar attached to the trailer. This is made U-shaped at the point of connection so as to provide for angularity between truck and trailer when passing over the crown of a hill.

The two-wheeled units are similar in design except for the wheel bearings, which in the 1,000-pounder are of the ball type whereas in the 1,500-pound model they are of the roller type. The smaller unit is supplied with a flare-board type body and the larger with a staked platform type. Wood drawbars are used in each case, the turning being provided for by means of a bolt dropped in a hole in a metal bar on the end of the drawbar and in another in a bracket



**A two-wheeled trailer developed by the Trailer Transportation Co., New York City, and now used under license from that company by the Chicago Pneumatic Tool Co. in connection with its Little Giant trucks to form a six-wheeled vehicle. The trailer wheels track with the rear wheels of the truck**

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attached to the rear of the hauling vehicle.

## Eagle

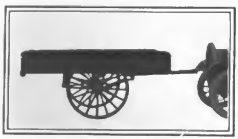
### Bottom-dump Four-wheeler and Two-wheeled Cart Types

**Eagle Wagon Wks., Auburn, N. Y.**

Characterized by the use of a special hitch so that trailers in train may be shifted to the right or left of the unit in front of it, Eagle trailers are offered in two- and four-wheeled types. The four-wheeled type is essentially a development of the Eagle bottom-dump horse wagon used for many years for farm purposes and as trailers behind steam traction engines in road construction work.

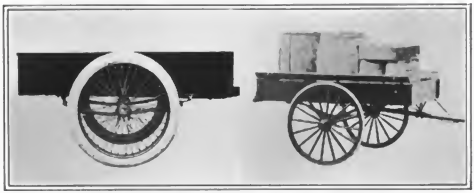
The two-wheeled type is at the present time only suitable for slow-speed work, having steel wheels with plain bearings and no springs.

The special feature of the Eagle trailer is the hitch used between the tractor and



Laura 1,000-pounder designed for high-speed work. Note the body is carried on three semi-elliptic springs

the first trailer of a train and between each unit of the train. This consists of a jointed drawbar which may be set at an angle to the longitudinal center line of the trailer and kept in this position by means of a bolt through holes in each member of the drawbar. When the drawbar is so set, it exerts a pull to the right or left, as the case may be, thus causing the following trailer to shift to one



At the left, the Brasie 400-pound trailer with wire wheels and pneumatic tires. At the right, a Lion 1,000-pounder with steel-shod wheels

side or the other but still have its line of motion parallel with that of each other member of the train. This avoids the making of ruts in the road. For instance, a train of six trailers with 4-inch tires would roll over a surface 4 feet wide.

None of the pull between the trailers is taken by the trailer bodies, this being transmitted by means of a steel rod running through each body, above the bottom gates and attached to the drawbar above the fifth-wheel in front and made into an eye at the rear to carry the bolt to connect the drawbar of the following trailer. Besides, each drawbar has a rod beneath it with a coil spring at the rear to absorb the shock in starting. This rod is attached to the drawbar forward of the front jointed member and to the front trailer axle at the rear, the coil spring being between the rear side of the axle and a washer on the rear end of the rod.

## Jackson

### Two Models of Light Two-wheeled Trailers

**Campbell Mfg. Co., Jackson, Mich.**

Two models of light two-wheeled trailers, one of 1,000 pounds capacity and the other of 1,200 pounds, comprise the Jackson line. Each is of practically the same design, except for the body. That of the 1,200-pounder has removable slat sides and ends whereas the 1,000-pounder has a low-sided panel body of slightly less carrying capacity.

Semi-trailer with huge steel body made by the Senderling Mfg. Co., New York City, for carrying garbage and refuse

Each model is fitted with wood wheels carried on ball bearings. Either steel or solid rubber tires may be fitted. A double-swivel coupler mounted on a wood drawbar provides the steering around corners.

## Laura

### Price Feature of 1,000-pound Two-wheeled Type

**John F. Laura, Coldwater, Mich.**

Designed for high-speed work behind passenger cars or light trucks, the Laura two-wheeled trailer has a capacity of 1,000 pounds and is fitted with steel tires, although solid rubber tires are offered as an extra.

The body, which is of the flareboard type, is carried on three springs, all semi-elliptic, one on each side and one at the rear.

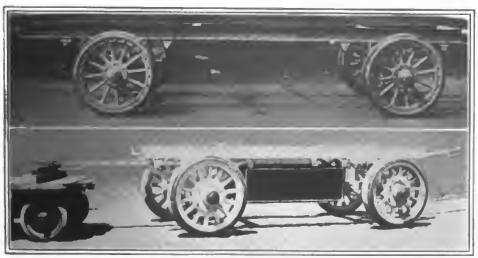
The drawbar is of wood with a metal end and kingbolt for connection with a metal bracket mounted on the frame of the hauling vehicle.

## Lion

### Two-wheeled 1,000-pounder

**Lion Buggy Co., Cincinnati, O.**

One model of the two-wheeled type designed to carry 1,000 pounds comprises



At the top, chassis view of the Detroit 3-tonner showing spring suspension, truck-type axles and wheels with rubber tires. Bottom, a Detroit 7-tonner, showing details of drawbar. Both of these models are steered by conventional steering knuckles and tie rods connected with the rear ends of the drawbars

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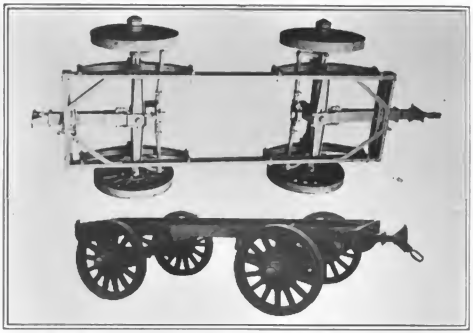
the Lion line. Solid rubber tires are employed on 34-inch wood wheels carried on roller bearings. The body is of the flareboard type with 8-inch sides Semi-elliptic springs are used in the conventional manner. The trailer tread is 56 inches.

## Little Giant

### Two-wheeled Trailer Makes Six-wheeled Truck

**Chicago Pneumatic Tool Co., Chicago.**

Offered in conjunction with a 1½-ton Little Giant chassis to form a six-wheeled truck, the two-wheeled trailer developed by the Trailer Transportation Co., New York City, consists of a dolly which supports part of the load, the remainder being carried on a special form of ball-race on the truck frame. A feature of this trailer is that the trailer wheels track exactly with the rear wheels of the truck, this being accomplished by means of a fifth-wheel on the trailer and the ball race on the truck. In turning corners the body remains parallel with neither the longitudinal center lines of the trailer or the tractor. This permits turns to be made with the trailer on the same turning circle of the tractor, although the load space of the unit is greatly increased.



Plan and profile views of Troy 2½-tonner showing frame, spring suspension, drawbar and tie-rods between the latter and the steering knuckles by which it is steered. Note the train type of drawbar which is carried on springs. Troy trailers are furnished with either solid rubber or steel tires

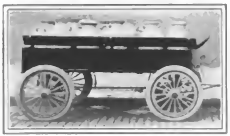
## Miami

### Light Four-wheeled and Two-wheeled Trailers

**Miami Automobile Trailer Co., Troy, O.**

Miami trailers are made in three models, two four-wheeled types and one two-wheeler, the former to carry loads of 1,000 pounds and the latter of 600 pounds. All three models are carried on solid rubber tires and wheels mounted on roller bearings. The two four-wheeled models are identical except for the type of body supplied, one having a panel-sided open body and the other a pipe-rail type.

The four-wheeled models are each carried on two semi-elliptic springs placed crosswise of the body. They are steered by fifth-wheels and have telescoping drawbars using coil springs to absorb the shocks incident to starting and stopping.



Simplex 1,200-pound four-wheeler which is featured by the use of the Simplex short-turning gear

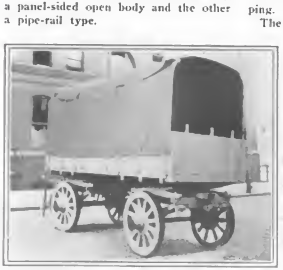
The two-wheeled model is carried on two semi-elliptic springs in the conventional manner, has a spring drawbar and is fitted with a pair of hinged legs at the front which are swung down to keep the body upright when not connected with the hauling vehicle.

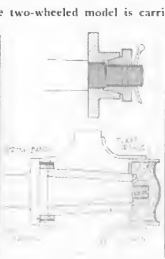
## Shadbolt

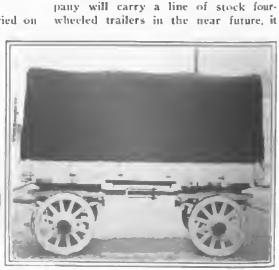
### Four-wheeled, Two-wheeled and Semi-trailer Types

**Shadbolt Mfg. Co., Brooklyn, N. Y.**

Built on order, Shadbolt motor truck and tractor trailers now in use embrace four-wheeled, two-wheeled and semi-trailer types. These were all built to suit the particular haulage conditions of each purchaser. No Shadbolt trailers are now carried as stock models, although it is expected that the Shadbolt company will carry a line of stock four-wheeled trailers in the near future, it







At right and left, views of Shadbolt trailers recently built on war orders and which steer on both sets of wheels. Also note the brakes which are operated automatically when the speed of the trailer tends to exceed that of the tractor. In the center, at the top, the Shadbolt double nut for use on plain-bearing axles and which cannot turn off when the vehicle is run backwards. Bottom, the Shadbolt improved plain bearing for trailers which must carry heavy loads

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having recently completed a large order for trailers of this type for the allied armies abroad.

These trailers embodied several novel features, tracking with the rear wheels of the tractor by means of a special Shadbolt steering device which turns both front and rear wheels in rounding a corner and having brakes on all wheels which work automatically without any attention on the part of the driver. The load platform is carried on two fifth-wheels which in turn rest on two others, one on each axle and spring assembly. The two axle and spring assemblies are connected by a jointed rod which permits the wheels of each set to turn to the proper position to track with the hauling unit when negotiating a corner.

The automatic brake is operated from the trailer drawbar, which is arranged to slide longitudinally for a certain predetermined distance. As soon as the trailer speed tends to exceed that of the tractor, the drawbar is pushed forward, thus working the brake levers so as to force the brake shoes against the steel tires. This type of trailer is shown at the bottom of page 12.

Practically all Shadbolt trailers are equipped with steel tires and plain bearings, especially those for heavy loads. The bearings used have been devised by the Shadbolt company to stand the high tractor speeds as compared with those of horses. Reversible trailer wheels are also equipped with a special two-part axle nut to prevent it from turning off when the trailer is run backwards. This nut and the Shadbolt plain bearing for truck trailers are shown at the bottom of page 12.

The Shadbolt company has also devised a special form of self-centering shock-absorbing fifth-wheel which is featured by the use of a cone-shaped kingbolt. The device was pictured and described in the June 1, 1915, issue of THE COMMERCIAL VEHICLE.

Bottom a Watson 4-ton bottom-dump motor truck trailer as a four-wheeled unit. Top, at the right, the Watson 5-ton model as a semi-trailer with the fore-carriage removed. Top, left, rear view of the 4-tonner, showing the type of coil springs used on the rear axles

## Simplex

### Four-wheeled Types Featured by Short-turning Gear

**Simplex Short-turn Gear Co., Anderson, Ind.**

Short-turning, Simplex trailers are offered in four four-wheeled types, two to carry 1,000 pounds and the others 1,200 pounds. They are characterized by the use of a reach pivoted to the center of the front and rear axles which permits both sets of wheels to turn while rounding a corner by means of a system of drag-links joined at each end to one of the axles.

By this means the trailer wheels track with those of the hauling vehicle and there is very little tendency for the rear end of the trailer to slew around when negotiating a corner.

Elliptic springs are used both front and rear on each model. Solid rubber tires are fitted as stock equipment on 30-inch wheels carried on ball bearings, although pneumatic tires on wire wheels may be supplied as an extra. Bodies are of the conventional flareboard type.

Detail of the steering mechanism of Troy trailers

Three-quarter view of the Troy 2½-tonner, showing details of steering knuckle and drawbar

## Troy

### Six Four-wheeled Models for Loads of 1½ to 5 Tons

**Troy Wagon Wks. Co., Troy, O.**

Six models, all of the four-wheeled type, comprise the line of Troy trailers, all of which are featured by their close resemblance in design and the conventional type of motor truck except for the absence of the motor, gearset and other propelling parts. Although the Troy company has been making horse

(Continued on page 36)

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## Laws That Work both Ways

IT IS a poor rule that does not work both ways. It is a poor traffic code which does not regulate all users of the public streets. In the latest bulletin of the Police Department of the City of New York a series of tables are published which prove conclusively the contention of a number of investigators of authority that, as the bulletin states: "The persons injured, if not entirely responsible, are at least guilty of contributory negligence."

In remarking on this report, the New York Tribune states: "By far the greatest number of accidents is attributed to 'Crossing street not at crossing,' 294. Next in order comes 'Improperly boarding or alighting,' 171. Third, 'Playing in the street,' 137. None of the other causes approaches these in frequency. The common faults of drivers are speeding and taking the wrong side of the street, but these irregularities are held accountable for only twenty-seven accidents."

The Safety-First Society of New York has done some excellent work in marking out pedestrian crossings on certain points on Fifth avenue, but so far there has been no official action for the purpose of forcing pedestrians generally to cross all streets at the appointed places—the intersections of sidewalks and in a direction perpendicular to the street and not diagonally—or in conformance with the direction of vehicular traffic as ordered by traffic officers on congested corners. Such regulations are well inforced in such cities as Detroit and Indianapolis, yet Chicago, New York, Boston and Philadelphia, except in a limited degree, have failed to grasp the importance of such measures.

Street accidents to pedestrians are caused by the collision of vehicles with people. Such collisions can only occur when either vehicles or pedestrians occupy crossings when they should not. Traffic officers are stationed at congested crossings for the purpose of so regulating traffic that such erratic moving shall not occur, and yet are given authority to regulate vehicular traffic only.

With the facts in hand and the efficacy of police traffic control proven, it is encouraging to note that New York City is taking active steps toward intelligent regulation of foot traffic. If New York takes the proper and only logical action, surely the other large cities can do nothing other than follow suit eventually.

## Farming and Selling

MARKETING intelligently is as much a part of farming as is the planting, cultivating and harvesting of products of the soil or the breeding, raising and fattening of animals. The chief difference between the man with the hoe and the modern agriculturist is that the former was a laborer in the fields while the latter is a man engaged in the business of farming. An industry consists of the production and marketing of goods, and the neglect of either factor affects the resultant gains.

Motor trucks are finding an increased use in connection with farming and stock raising because they solve the problem of quick marketing. The time to sell is when the market is good. Market fluctuations are often abrupt and it is the man who can act quickly when the market changes who can command the highest prices for his goods. To market too early is as fatal as to market too late. The farmer with a truck can locate farther from shipping or marketing centers, thereby securing his land cheaper, and through the swiftness and tirelessness of his vehicle, can await rising prices with utter confidence of his ability to get his product to the buyer when the market is at the top.

The greatest corn crop, in point of value, ever harvested has been cashed in. Two billion dollars was its value. Surely here is a field in which the truck is needed. A field which can well afford the investment involved, in view of the important advantages resulting.

## Railroad Co-operation

WHEN motor trucks fail to show economy on short hauls it is usually because of loading delays. There are many instances in which the evil of slow loading and unloading has been cured by the individual effort of the truck user.

There are many others in which the user is helpless because it is a railroad or other outside party which controls the time of loading. A big eastern publisher has solved the problem by co-operating with a great railroad system. One of the large Akron rubber factories is undertaking a similar arrangement. Watch it grow.

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# SWAPS TRUCKS WITH PROFIT

PRACTICAL, aggressive and a finished annalist of cost calculations, Roderick Stephens is the man behind the fleet of nine motor trucks maintained by Olin J. Stephens, Inc., one of the largest retail coal dealers in New York City. The novel things about this truck equipment are that it is only sufficient to handle the average deliveries of the company and that no increase in delivery area has been secured by its use.

To understand why Stephens did not purchase a fleet sufficient to handle all his deliveries with his own vehicles and why the motor trucks have not enabled additional territory to be obtained, one must understand the conditions of the Gotham coal trade.

The volume of business done by the coal companies in New York City throughout the year varies greatly, as it does in other large and small cities in all parts of the country. This great variation is due to the procrastination of human beings who put off buying coal as long as possible and to the fact that much more coal is burnt in the winter months than in the summer.

Also, as none of the coal-carrying railroads have facilities for handling coal within the city limits, practically all of the 14,000,000 tons of coal used annually in New York City is floated to the different retail yards in barges. Because of New York's excellent water facilities, and especially Manhattan Island which is completely surrounded by navigable waters, there are a very great number of waterfront yards, all in competition with one another.

Stephens recognized these two conditions soon after joining the active force of his father's company in 1906 and showed his practical bent and aggressiveness by determining the size of his truck fleet and the territory which it should cover in order that it be maintained economically and at the same time meet the very severe competition.

He first became weight master; then outside superintendent and finally shipper in charge of all the horse wagons the company then used. He often rode with the wagons; went down into the cellars of the houses at which the coal was delivered and often helped shovel it into the basement. He thus learned the delivery end of the business from the bottom up. He also analyzed the cost of delivery by means of horses. He found that while horses were reliable in the spring and fall months, they often caused a disarrangement of the delivery schedule in the hot summer because of the heat and in the winter because of the snow and slippery pavements.

When in 1908, the Stephens company purchased its first motor vehicle, he was well able to take care of its maintenance and direct its method of operation. As the company added other trucks to its fleet, Stephens took charge of each and had cost records compiled from day to day, from month to month and year to year. He found that while there was plenty of work for the trucks to do for 10 months of the year, there was practically none during the months of July and August. Again, during the most severe months of the winter, there was so much work that his trucks could not begin to handle it.

From his knowledge of the cost calculations compiled under his supervision, he was able to determine that it would not be economical to maintain a fleet sufficient to handle the winter rush business because of the long idle, unproductive periods during the summer months. He had too many trucks for his summer work and not enough for the winter. Even to maintain a fleet sufficient to handle the average deliveries and to hire others for the rush periods, left him with an oversupply in the summer.

Stephens solved this problem in a very practical way by entering into a yearly agreement with a Bronx contractor, to supply him with his surplus trucks in the summer, when the contractor's work was large, and to have the contractor furnish him trucks during the winter months when they ordinarily would be laid up due to the cessation of most contracting work in the freezing weather.

While at first thought, this might seem unpracticable because a truck body suitable for the delivery of coal is not generally adapted to contracting work, Stephens overcame this objection by designing a rectangular steel dumping body from which the coal can be chuted to the side or the rear and which can also be used for contractor's material such as sand, stone and cement by the use of two sets of side boards. He had bodies of this type fitted on his trucks which become surplus equipment in the slack periods and prevailed upon the contractor to do likewise. By this method, Stephens gets the most out of his trucks because they are operated uniformly throughout the year, if not for himself, for the contractor, while the latter returns to him an equivalent equipment during the rush periods, just when he requires it. Excess work over that which can be done by his own trucks and those secured from the contractor is handled by hiring other vehicles on a daily basis.

These trucks have not increased the delivery radius of the Stephens company but have rendered quicker and more efficient service in the same area as previously covered by the horse wagons. The reason for this is not due to any inability

(Continued on page 20)

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# May Tax Exports for Army Needs

## To Rai e 200 Millions Will Require 20% of Value

WASHINGTON, D. C., November 10—So that this country's preparedness may be paid for, in a measure at least, by those responsible for its necessity and those who profit most by it, a plan is being put forward by government officials by which a war export tax may be made to provide $200,000,000 for defence. This tax would fall heaviest upon the European belligerents and the manufacturers of military supplies, including manufacturers of motor trucks.

The total war exports are said to exceed $1,000,000,000 in the last 9 months of the present calendar year, so that a 20 per cent tax on such shipments would raise $200,000,000 in less than a year.

### BRONX MERCHANTS WANT MAIL TRUCKS

NEW YORK CITY, November 9—The Bronx Board of Trade of the Borough of the Bronx, New York, has filed a complaint with the Post Office Department against the poor facilities afforded in the delivery to and from the Bronx.

Edward D. Boynton, president of the Board, states that letters from the west reach Bronx business houses a day later than those in Manhattan Borough. He states that it takes a whole day for letters to go from the Bronx to Manhattan or reverse.

The most important complaint made by Mr. Boynton is that only horse wagons are used in the delivery of Bronx mail, whereas motor trucks are used on Manhattan. The Bronx has a population of 700,000 persons and is the only community of such size which has not a post office of its own.

### HUTCHINSON ON NAVAL BOARD

ORANGE, N. J., November 9—Dr. Miller Reese Hutchinson, chief engineer of the Thomas A. Edison companies, has been appointed by Secretary Daniels as assistant to Mr. Edison on the Naval Advisory Board. This has been made necessary to some extent by the deafness of Mr. Edison. He and Dr. Hutchinson communicate by touch telegraph.

### GOTHAM BUS FIGHT BITTER

NEW YORK CITY, November 8—At the hearing on the new motor bus franchise for the New York Motor Bus Co., which the Franchise Committee of the Board of Estimate of the City of New York advised granting, held here today, vigorous protests were made by the Interboro Rapid Transit Co., operator of subway and elevated lines, and the New York Railways Co., operator of surface cars. These companies complained that the competition would plunge them into bankruptcy because the buses would take the cream of the short-haul traffic.

It was rather a surprise that the learned counsels for these companies could devise no better reason for opposition, for with all three of the sub-surface, surface and elevated lines much overcrowded already and the Board of Health endeavoring vainly to reduce congestion, it is obvious that the buses, even if operated in direct competition with the rail lines, could not do more than provide a very welcome relief to intolerable congestion. Another hearing on a second proposition to be made by the Fifth Avenue Coach Co. is yet to be held before any final action can be taken.

### JERSEY JITNEYS TO SUCCUMB TO MOTOR BUS LINES

ASBURY PARK, N. J., November 4—The New Jersey Utilities Assn. at its 2-day session held at the Metropolitan hotel here, entertained the authorities from the various along-shore municipalities at a banquet. J. Fithian Tatem presented a paper on "The Inroads the Jitneys Have Made on Trolley Receipts," which was voted the most interesting at the meeting.

The discussion of this paper brought out the opinion that the small jitneys will eventually be succeeded by large buses and that while this may work a temporary hardship the final result will be favorable to all parties concerned, as the bus lines will relieve the trolley companies of the operation of unprofitable lines and will act as feeders for them.

### LINCOLN HIGHWAY PROGRESS

NEW YORK CITY, November 3—Austin F. Bement, secretary the Lincoln Highway Assn., has just issued a report of progress during its second year. He states in this report that over $2,250,000 has been expended on improvement and that greater sums still have been assured for future work by bonding.

Over half the total distance has already been marked, says Mr. Bement, and official approval has been given the work by President Wilson, the governors of the states traversed and many members of the House and Senate of Congress. The work of the past year has been along lines of improving the surface of the highway, marking it legibly and diffusing educational literature.

### Coming Commercial Vehicle Events

| | |
|---|---|
| Nov. 16 | Newark, N. J., Monthly Meeting, Motor Truck Club of New Jersey, Automobile Club, 72 Washington place. |
| Nov. 17 | New York City, Monthly Meeting, Motor Truck Club of America, Automobile Club of America. |
| Nov. 18 | New York City, Mer. Sec. S. A. E. Meeting, Automobile Club of America. |
| Nov. 29-Dec. 4 | Electrical Prosperity Week. |
| 1916 | |
| Jan. 5-6 | New York City, S. A. E. Winter Sessions, Standards Committee Meetings. |
| Jan. 8-15 | Cleveland, O., Show, Wigmore Coliseum. |
| Jan. 8-15 | Philadelphia, Pa., Show. |
| Jan. 29-Feb. 5 | Columbus, O., Motor Vehicle Show. |
| Jan. 29-Feb. 5 | Minneapolis, Minn., Motor Vehicle Show. |
| March 4-11 | Boston, Mass., Motor Vehicle Show, Mechanics' Hall. |

# 2,227 Trucks Shipped Abroad in Sept.

## $5,882,255 Worth Exported—Figures for War Year

WASHINGTON, D. C., November 1—Nearly eighteen times as many trucks were exported September, 1915, as in September, 1914, in spite of the fact that the previous September was a war month and war orders for trucks were being filled. This number represents more valuable trucks, furthermore, as the value is nearly twenty times as great.

The figures are 2,227 vehicles, valued at $5,882,255 for September, 1915, as against 128 vehicles, valued at $294,288 for September, 1914.

War shipments started in September, 1914. In the 12 months since that time nearly twenty thousand trucks have been exported, valued at almost fifty-six millions. The exact figures are 19,226 trucks, worth $55,982,715.

The September exports represent in numbers 613 in excess of August and in value $1,495,062. These export figures, as far as the number of vehicles exported goes, are exceeded by only 3 months in history, these being May, June and July of this year.

### HORSE EXPORTS EXCEED TRUCKS

WASHINGTON, D. C., November 1—With motor truck exports as great as American builders can make them, and continuing at an increasing rate ever since the beginning of the war, horse exports are even greater, all of which bodes well for both the domestic and foreign trade in motor trucks after the close of the war.

For September, 1915, 44,345 horses and 10,094 mules, valued respectively at $8,032,467 and $1,996,195, were exported from the United States. The combined total is 54,440 animals, worth $10,028,662. The average value of the horses is $181 and of the mules $198.

### FRANCE FORSTALLING U. S.

DETROIT, November 3—According to advices received by the Internal Gear Drive Assn. from its French correspondent, France has adopted means to dispose of the second-hand truck problem which it is feared will upset matters somewhat at the close of the war and at the same time to forstall any American invasion of the French market.

At a recent auction, 740 of the Paris buses were auctioned off to private users. These buses were replaced by an equal number of similar vehicles from the De Dion shops for service at the front.

The American trucks which the French were forced to purchase at the beginning of the war are being worn out in war work and are being replaced by French-made trucks so that at the conclusion of the conflict little else than French trucks will be on hand. By selling used French trucks to private concerns, these are forstalled from purchasing American vehicles, which they might thereafter continue to buy so as to keep their fleets uniform.

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# G. V. and Peerless Are Merged

## To Build Trucks and Motors —$20,000,000 Capital

NEW YORK CITY, November 4—A great merger has been made of the interests of the General Vehicle Co., Long Island City, N. Y., and the Peerless Motor Car Co., Cleveland, O., under the name Peerless Truck & Motor Corp. A capital stock of $20,000,000 has been authorized, to be issued in 400,000 shares of $50 par value. Five million dollars in 6 per cent, 10-year gold notes may also be issued, these notes to be convertible into stock at par after 1 year.

Both the G. V. and Peerless companies, as has been known for some time, are largely controlled by the General Electric Co., the former having been organized by the Schenectady corporation and the latter having been of late acquired in a large degree by the National Lamp Division of the General Electric Co.

The General Vehicle Co. is the largest manufacturer, as well as one of the oldest, of electric commercial vehicles in this country and in addition for several years has been American licensee under the Daimler patents. It has been manufacturing the German Mercedes truck in its Long Island plant as the G. V. Mercedes and also as the American Daimler.

The Peerless Motor Car Co. was at one time a leader in the production of high-grade passenger cars, but of late has largely concentrated on its commercial models, large numbers of which have been contracted for by the belligerent powers through its export agents, Gaston, Williams & Wigmore, of New York and London.

No definite announcement of policy or product has been made, but it is understood from the name of the new concern that it will engage chiefly in the production of commercial vehicles and aviation motors, the rights to the Daimler patents on the Mercedes aviation motor being in the possession of the G. V. company.

### LOCO WORKING NIGHT AND DAY

BRIDGEPORT, CONN., November 3—The Locomobile Co. of America is running its shops night and day, making trucks for the Allies. The company, it is understood, is shipping between forty and fifty trucks a week and orders on hand insure operations for several months.

It is estimated that profits from this source should be sufficient to pay interest charges on the $2,176,000 bonds and debentures outstanding, and leave a substantial balance for the 7 per cent $1,500,000 preferred and $4,750,800 common. No dividends have been paid on the preferred stock since 1912, but it is not a cumulative issue. The common stock is quoted at around 40 to 45 on the curb.

### STUDEBAKER PROSPEROUS

DETROIT, November 4—Earnings of the Studebaker Corp. for 1915 will fall slightly short of reaching the $10,000,000 mark, compared with a surplus for 1914 of $3,752,916, after allowing a charge-off of $402,698 for extraordinary expenses. On the $27,931,600 common stock now outstanding these profits work out a per share surplus this year of somewhat over $30, compared with just under $15 last year.

The larger part of this earning power of between $9,000,000 and $10,000,000 is from domestic business entirely.

The directors of the company yesterday declared a quarterly dividend of 1½ per cent on the common stock and an extra dividend of 1 per cent. According to a statement issued by President A. R. Erskine, this places the junior shares on a regular 10 per cent annual basis.

### WILLYS TO HIRE MORE MEN

TOLEDO, O., November 3—Ten thousand men will be added to the working force of the Willys-Overland Co. here as soon as additions to the plant have been completed, it is reported. The output of Overland delivery and passenger chassis is to be increased to 1,000 per week.

### BREWERS BUILD OWN TRUCKS

MILWAUKEE, WIS., November 3—The American Brewers & Bottlers Specialty Co., of this city, has started the manufacture of gasoline motor trucks especially adapted to use by breweries.

### MORELAND PRICES LOWERED

LOS ANGELES, CAL., November 6—Substantial reductions in list prices of Moreland distillate trucks have been announced by the Moreland Motor Truck Co. of this city. The capacities have also been somewhat changed since last January and the number of models reduced. Following are the old and new prices:

| 1915 | | Later | New List |
|---|---|---|---|
| ½-ton | $1,800 | | |
| | | 1-ton | $1,850 | $1,150 |
| 1½-ton | 2,050 | | 2,200 | 1,850 |
| 2½-ton | 2,650 | | 2,800 | 2,400 |
| 3½-ton | 3,500 | | | |
| | | 4-ton | 3,650 | 3,200 |
| 5 -ton | 4,000 | | | |
| 6½-ton | 4,500 | | | |

### U. S. PRICES LOWER

CINCINNATI, O., November 6—Radical reductions have been made in the prices for U. S. motor trucks by the United States Motor Truck Co., Cincinnati, O., recently. The 1915 models of 2, 2½, 3 and 4 tons capacity have been reduced approximately 25 per cent in each instance. The first-announced prices for the 1916 models were considerably below those of the 1915 models, but the most recent lists are even below these. The reduction is indicated in the following table:

| Capacity | 1915 Prices | First Reduction | New Prices |
|---|---|---|---|
| Model E, 2-ton | $2,550 | | $1,900 |
| Model H, 2-ton | | $2,700 | 2,200 |
| Model G, 2½-ton | 2,750 | | |
| Model D, 3-ton | 3,200 | | 2,400 |
| Model I, 3½-ton | | 3,400 | 2,800 |
| Model F, 4-ton | 3,550 | | |
| Model K, 5-ton | | 4,200 | 3,600 |

# Transport Tractor the Latest

## Long Island Factory Builds 5-tonner for $2,500

NEW YORK CITY, November 3—The Transport tractor is the latest addition to the roster of American commercial vehicles. It is produced in one 5-ton model by the Transport Tractor Co., Long Island City, N. Y. The tractor attains a very short wheelbase by placing the unit power plant between the seats, and is worm-driven. It has a new type of trailer connection for semi-trailers, consisting of a dome and cup, the dome surmounted by the kingbolt and the cup carrying the cup and kingbolt guide. It is designed to turn in a circle of 25 feet diameter, and is priced at $2,500.

### WESTINGHOUSE TO MAKE TRUCK?

MILWAUKEE, WIS., November 4—A heavy-duty commercial vehicle of the gasoline-electric type is being developed by the National Brake & Electric Co. one of the Westinghouse group. This vehicle is said to be especially intended for military adaptability. Little is being said at the present time, owing to the non-maturity of plans.

### WARNER BUILDING TRAILER

MILWAUKEE, WIS., November 3—A light trailer on two wheels for use behind light trucks and touring cars is being developed by A. P. Warner, one of the founders of the Warner Instrument Co., Beloit, Wis. Arrangements are being made to manufacture the vehicle on a large scale. It will be known as the Warner trailer.

### RANDOLPH, A NEW TRAILER

DETROIT, November 4—Succeeding the Standard Auto Truck Trailer Co., C. H. Randolph, Jonesville, Mich., is building the Randolph trailer. The trailer is made in but one type, having load capacities of from 1,000 pounds to 2,500 pounds. It sells for from $45 upwards. D. C. axles are used on some models and Timkens on others.

### RUMELY GOING AHEAD

SOUTH BEND, IND., November 1—Ninety-seven per cent of the creditors of the old M. Rumely Co., of Laporte, Ind., will be stockholders in the new Advance-Rumely company, according to a statement of Receiver Finley P. Mount. The sale of the property will be made in Laporte early in December, the petition for the sale having been granted by Judge Anderson in the Federal court at Indianapolis. In commenting on the Rumely company conditions, Receiver Mount said:

"Last January we estimated that the company would have a cash deficit at the end of the year of not less than $220,000, but during that time all receivers certificates, totaling $375,000, have been paid and we have not only gone beyond all chances of a deficit, but will have a surplus of approximately $200,000. Regardless of the trials of transacting business

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while in receivership, we have sold far more goods than included in early estimates. We did not cut prices and what is most pleasing to us we did business with a much better class of customers, who did not ask for time payments but immediately accepted their bills, discounted them and settled. The war has had its effect and also its teachings. We have been handicapped to a considerable extent by having machinery and money tied up, especially in Russia, but have it in such good shape that it is fully protected and eventually will be available. You will find that not only in Buenos Aires, but all through South America, there is a great demand for threshing machinery and other farming implements, and this is being provided by American manufacturers. We are optimistic concerning the business outlook, which is exceptionally good. Quite naturally the company will continue in the manufacturing field, making a specialty of small tractors, for which there is a heavy demand."

### H-B LICENSES BALL BEARINGS

PHILADELPHIA, PA., November 3—Fred E. Bright, president of the Hess-Bright Mfg. Co., of this city, has announced that the Conrad patent, controlled by the Hess-Bright company, has been sustained and recognized by other ball bearing manufacturers. The New Departure Mfg. Co., the Standard Roller Bearing Co., the Gurney Ball Bearing Co. and the U. S. Ball Bearing Co. have been licensed by the Hess-Bright company to manufacture under Conrad patents.

### TO REORGANIZE STANDARD

NEW YORK CITY, November 3—The receivers for the Standard Roller Bearing Co., whose receivership terminated November 1, 1915, have issued a statement setting forth that while the company has prospered in the last year, the indebtedness still stands at about $1,500,000, and that neither the interest nor any part of the principal of this indebtedness has been paid. Nevertheless the receivers advise that the company be reorganized and a creditors' protective agreement has been forwarded to creditors to formulate a plan for reorganization.

### TIRE INDUSTRY PROSPEROUS

NEW YORK CITY, October 29—Tire companies in this country are doing a large business. Heavy home sales of motor vehicles and the war's demands have brought about this prosperity. About 14,000 tires a day are being turned out by the B. F. Goodrich Co.; Goodyear is turning out about 10,000 and the U. S. Rubber is now making 8,000, and this amount will shortly be increased to 10,000. The Kelly-Springfield company will be producing 1,500 tires a day by December 1. The company has purchased a new plant at Worcester to take care of its production. At Akron operations are continued on a 24-hour schedule and the company is so far behind its orders that capacity operations are certain on the same 24-hour schedule throughout the remainder of the year.

It is said that the increase in the cost of fabric and crude rubber will probably decrease the net earnings of the tire makers in the closing half of 1915, as compared with the first half. Fabric is now selling approximately 25 per cent above the price prevailing early in the year. Crude rubber is close to 10 per cent higher.

# Service Managers Now in New Body

## Automobile Service Managers' Assn. of Michigan Formed

NEW YORK CITY, November 3—Upon his return yesterday from a trip through the west, Alfred Reeves, general manager of the National Automobile Chamber of Commerce, announced the formation of the Automobile Service Managers Assn. of Michigan, with headquarters in Detroit, and to have as members the service department men of the motor car concerns in Michigan, northern Ohio and western Ontario.

The purposes of the association are to promote personal acquaintance among the representatives of the service and repair parts departments of motor vehicle manufacturing companies; to consider the best methods of conducting the work of service and repairs; to promote the adoption of the most liberal policy of helpfulness to purchasers of motor vehicles, and to generally improve and facilitate cooperation among manufacturers, dealers and owners, with a view toward supplying the maximum of service to the mutual advantage of all.

Meetings will be held every month, at which papers on the problems of service will be read and discussed, with lectures and moving pictures of men and machines in factories and their operations.

The Indianapolis service managers have already been organized, and associations will be formed in Chicago and probably in Cleveland.

At the organization meeting a constitution and by-laws were adopted, and the following officers elected for the ensuing year:

President, C. R. Lester, Packard Motor Car Co. Vice president, E. P. Rippengill, Hudson Motor Car Co. Secretary-treasurer, E. H. Hazelton, Regal Motor Car Co.

Executive Committee: J. L. Kenyon, Cadillac; H. O. Weisse, Oakland; H. G. Fitch, Overland; C. W. Matheson, Dodge; Charles Gould, Maxwell, and Pierre Schonn, General Motors Truck Co.

The service managers of eighty-five companies in the territory adjacent to Detroit are eligible to membership, applications being made to E. P. Hazelton, secretary, Regal Motor Car Co., Detroit.

### MILBURN JOINS N. A. C. C.

NEW YORK CITY, November 4—The Milburn Wagon Co. maker of the Milburn light electric truck, has been admitted to the membership of the National Automobile Chamber of Commerce along with four other makers of passenger cars recently.

### HARDWAREMEN WANT ACCESSORY TRADE

PHILADELPHIA, November 3—The National Hardware Assn. of the United States, at its Atlantic City convention recently terminated, went on record as favoring the sale of motor vehicle accessories through the hardware trade.

A separate meeting was held by such of those as were interested on Thursday, October 14, and a resolution was adopted creating the Automobile Accessories Committee to treat with accessory manufacturers for the purpose of arranging for standard trade practice in the sale of motor vehicle accessories and to foster their co-operation in promoting the sale of such goods through retail hardware dealers.

It was also resolved to form the Accessories Branch to fulfill a similar mission in the hardware jobbing trade.

### WILSON WANTS TRUCK SHOW

DETROIT, November 3—Stanley Wilson, of the J. C. Wilson Co., of this city, in a statement made here recently came out strongly in favor of a national truck show, separate from the passenger car expositions, and located in Detroit, as the center of the industry and convenient to all parts of the country.

Mr. Wilson points out that while heretofore no other facilities than the Michigan State Fair building were available, now a great new exhibition hall, to be known as the Merchants and Manufacturers' building, is to be built which will provide ideal quarters for a national truck exposition.

### TROUBLESOME HEADLIGHT LAW

BOSTON, November 3—The new regulations framed by the Massachusetts Highway Commission to control motor headlights will cause some bother to the owners of commercial vehicles. One section states that the lights shall not throw a beam higher than 3½ feet above the ground at a distance of 50 feet. Many of the trucks have lights located 5 and 6 feet from the ground, and to tip them down would not do any good. They will have to be lowered on both sides. Also the rays of some of them are not very strong, so the requirement that they shall show an object at least 150 feet ahead very clearly will mean changing to more powerful lamps on some of them. And the added clause that the lights shall illuminate the road at either side of the vehicle 10 feet and at a distance of 10 feet ahead will not be relished.

### TAYLOR GLEE CLUB

BOSTON, November 13—Albert S. Holly, manager of the New England branch of the R. E. Taylor Corporation, Garford agents, has formed the R. E. Taylor Club here, comprising salesmen and members of the clerical force. The first dinner of the new club took place Wednesday evening, November 10, when addresses were made by R. E. Taylor and J. B. Cowen, who made the trip from New York especially for the affair. Remarks were also made by the officers of the new club, who comprise R. L. Dean, president; A. S. Holly, vice president; T. F. Kerrigan, secretary-treasurer.

Meetings are held every Wednesday evening, at which all the sales force must be present, when the work for the week past and the week to come is gone over thoroughly. Talks are planned for different evenings by men prominent in the motor and newspaper world.

### NEW EMPIRE STATE TAGS

ALBANY, N. Y., November 3—License number plates for New York State for 1916 will differ radically from those of previous years in that the figures will be hyphenated, as those on some baggage checks, thus making their reading and recollection easier.

The hyphen will appear between the second and third numerals. In order to

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reduce the number of figures on each plate, without the use of the cryptic letter denoting tens of thousands, etc., as now, New York has been divided into three districts, the district of New York City, of Albany and of Buffalo. Each will have a distinctive number plate.

The 1916 plates will have dark blue numerals on a light cream ground. The N. Y. 1916 legend will be underneath the numbers instead of at the side. The letter B preceding the number will indicate the Buffalo zone; the letter A the Albany zone, and no letter at all the New York City zone.

### TRUCK CLUB TO HAVE NOVEL SERVICE DISCUSSION

NEW YORK CITY, November 11—The Motor Truck Club of America will discuss service in a novel manner at its regular November meeting, to be held Wednesday, November 17, at the Automobile Club of America, Fifty-fourth street, between Eighth avenue and Broadway.

The meeting will take place at the dinner table, an informal banquet taking place just before the meeting and the discussion taking the form of a round-table discussion.

The subject has been divided into two sides, service as viewed by the motor truck owner and service from the standpoint of the trade. Each side will be represented by six speakers, each of whom will give a 10-minute talk on one phase of the subject, after which an open discussion will take place.

Speakers have been selected from among the membership, actual owners of trucks representing one side and service managers in the Metropolitan district the trade's side of it.

### N. Y. E. V. A. ACTIVE

NEW YORK CITY, November 10—Members of the Electric Vehicle Assn. in New York City are busy of late, two meetings of interest occurring within a week. The New York section of the E. V. A. held its first meeting since last spring at the Consolidated Gas Co. building, Fifteenth street and Irving place, tonight, and on Monday, November 15, members of the New York Section of the E. V. A. have been invited to attend the meeting of the National Electric Light Assn., New York Companies' Section.

At tonight's meeting the election of officers was held, D. C. Fenner, of the G. V. company, being made chairman, S. G. Thompson, of the Public Service Electric Co., Newark, N. J., vice chairman, and David S. Tobias, of the United Electric Light & Power Co., New York City, secretary.

Charles A. Ward presented his paper on "Field for the Small Electric Vehicle," substantially the same as he read at the recent E. V. A. convention in Cleveland and as reproduced in the November 1 issue of THE COMMERCIAL VEHICLE. John C. Delahant gave an interesting illustrated talk on the Ward-Edison Durability Run from New York to Cleveland.

At the meeting next Monday John R. Eustis will present a paper on "Warfare by Automobiles." Mr. Eustis, motor editor of the New York *Evening Mail*, has made a study of this subject and has been heard on it on several previous occasions. Mr. Delahant will give further details of the Cleveland run in his paper, "New York to Cleveland Ward Special Run."

# Bay State Trucks Are Doomed Unless—

## Irresponsible Legislators Propose an Outrage

BOSTON, November 1—Under the guise of a plan to raise additional revenue for the Bay State, there is under way now a scheme of taxation on motor trucks that may lead to barring them from the highways eventually. When the motor representatives went to the State house last Thursday to speak on proposed fees, they were amazed at the bill that they saw. They had no inkling that anything so drastic was even thought of, and for a time they were at a loss whether to begin the fight there or wait to act before the legislature later.

The hearing was called by a special recess committee appointed by the last legislature to devise ways and means for raising additional taxation. And before it was this this plan to increase fees all around. Here is the clause in reference to motor trucks:

"For the registration of every motor vehicle equipped in whole or in part with hard tires of rubber, metal or other materials, 30 cents for each 100 pounds of weight of the vehicle and its load when loaded to its full or normal carrying capacity; and 50 cents additional for each horsepower developed by the motor at full capacity."

In other words, a 5-ton truck would pay first on 10,000 pounds, its full carrying capacity; then added the weight of the vehicle of 8,000 or more pounds at 30 cents per hundred; on top of that would be the horsepower rating. So a 5-ton truck with a 40-horsepower motor would pay some $74. And no provision is made for eliminating the personal property tax which on such a truck would average close to $50 more. At present a 5-ton truck pays $17.

To prevent any other cars now used for business purposes to get in the present business class registration it also provides that cars whether used for business purposes or not must pay 25 cents for each 100 pounds of the weight of the vehicle and its load when loaded to full normal capacity, reckoning the average weight of each passenger at 150 pounds, and 50 cents additional for each horsepower developed by the motor at full capacity.

The only motor associations represented at the hearing were the Boston Automobile Dealers Assn, the Boston Commercial Vehicle Dealers Assn, the Massachusetts State A. A. and the Bay State A. A. Not much was known of the matter, it seems.

John B. Sullivan, Jr., appearing for the two dealers associations, said he was astounded at the proposed plan. He argued that the present law was bad enough now, and unconstitutional, but to make it a double-barrelled affair would mean a test in the courts undoubtedly, with the possibility of the law being ruled out entirely, leaving the state little revenue. He cited what other states had done in court decisions along similar lines.

Members of the committee asked him many questions to get an idea if the motor organizations did not favor some increase to help the state. It was admitted by members of the committee that the measure was so drawn that the state would get at least 50 per cent more revenue from the motorists. And there is a cunningly devised rider in it whereby the proposed increase is to be divided between the state and the cities and towns. This is so it would be favored by the representatives from the country districts.

James T. Sullivan, representing the Bay State A. A. the motor editor of the *Boston Globe*, also appeared in opposition to the bill. He told the committee flatly that it would be an utter impossibility to try to get such a measure through the legislature. Going into details he showed the committee the enormous revenue the state has received from motor cars, factories, accessories, etc., and the thousands employed now at good wages, an asset that could not be measured in money. He showed where many trucks never go on State highways, and they would be paying for something they never received. In answer to a question on the constitutionality of such a measure he stated that courts elsewhere had held that all machines should pay one flat fee. Then he pointed out that a 40- or 50-horsepower vehicle has no special privilege on the roads that are not enjoyed by the 20- or 30-horsepower vehicles, for all may go anywhere, and to compel the owner of the larger vehicle to pay more than the owner of the smaller one was in effect unconstitutional.

He cited cases where horse-drawn vehicles were responsible for much damage to the highways, but were not asked to contribute to any tax. Then he told the committee of the fights made before against such measures, and they were more often a success.

W. G. Renwick, representing the Massachusetts State A. A., also opposed it, stating that now the motorists were willing to continue paying the present fee but would object to an increase, and test it in the courts. F. B. Holmes, of the Kissel Kar branch, the only dealer who spoke, objected to the measure as a plan to stifle the motor industry.

During the hearing one of the members of the committee remarked that he believed the Highway Commission was in favor of ruling all heavy trucks off the highways.

This recess committee has the power to recommend to the legislature any measure it may seem fit, and then the fight would have to be started in the legislature. Apparently whoever drew up the bill foresaw this and he devised the little joker that provides for 50 per cent of the increase to go to the cities and towns, with the idea that the senators and representatives from the country places would vote for it to get some revenue. Meanwhile the motorists have planned a campaign to offset any such legislation if the committee should recommend it.

### TRADES TRUCKS FOR MULES

BALTIMORE, MD., November 6—Owners of horses and mules in Baltimore have an added inducement to buy Selden trucks of the De Moss-Merritt Truck Co., since that company has offered to take the animals as part payment on new trucks. The time-payment method of merchandising which is a feature of the Selden sales scheme is the other.

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## An Ideal Demountable Body Trucking Scheme

(Continued from page 7)

$4,400 in investment has been saved and $4,900 annual expense pocketed, by substituting removable bodies for an excess number of vehicles. This saving, however, was not a matter of choice, as it would be practically impossible to handle the Pennsylvania mail with trucks with fixed bodies as it is now handled owing to the congestion.

When it is considered that formerly when each truck made seven loads in a 10-hour day as against thirteen in 9¾ hours, or nearly twice that number, which is the record of one truck, it will be seen that nearly twice the number of fixed-body vehicles would be required to do the work which the present 3½-tonners are potentially able to accomplish. It is not possible for all of the trucks to work continuously at this rate, however, on account of the congestion at Fifteenth street, even with the new body system. Obviously, fixed-body trucks in any number, could not approach this figure.

The new 3½-tonner recently purchased was not strictly an addition to the fleet, for the Curtis company traded in the 1-tonner as being too light. This truck had been used for the collection of light shipments from the freight stations and for special delivery work. Among its duties was the transportation of ink. Sometimes a single shipment of ink will weigh 6 tons, which meant six separate trips for the 1-tonner as against two for the 3½-ton size.

The next step which the Curtis company will take in enhancing the high degree of efficiency already attained in its transportation system will probably be the application of removable body equipment at the warehouse and in the courtyard of the plant.

It is unlikely that it will be extended to the post office, as physical conditions there do not permit, or is the volume of mail which has to go through the post office instead of being sent direct to the mail cars sufficiently great to warrant any great effort in this direction.

### Forty-six Loads in 1 Day

In one day forty-six loads of mail has been transported by the removable body equipment, the four 3½-tonners being used up to nearly the end of the day when as the last few loads were being cleaned up some of the 5-tonners were impressed temporarily.

It would pay any executive who has any quantity of hauling of similar nature to that done by these publishers to carefully consider the experience recounted above. The removable body, wherever practicable, is perhaps preferable, although in some instances a nest body is better adapted. Much of the remarkable efficiency which is secured by the use of tractors and semi-trailers is due to the ability of the tractor to leave the loaded body to be unloaded while it makes a trip with an empty one, or *vice versa*. The simple Curtis scheme makes it possible to secure the same effect with a standard motor truck.

A precedent has been set by the Pennsylvania railroad that should hearten others who suffer from inefficient terminal facilities to make further endeavors toward co-operating with the carriers to effect mutual improvement in terminal convenience. The removable and nest body is of greatest value when it is most interchangeable.

### Practical Tailboard Delivery

The associations which have in the past 2 years clamored for tailboard delivery and receipt of freight over steamship bulkheads and railroad platforms may considerably advance their cause by formulating a practical, workable and mutually-advantageous plan for increasing the efficiency of present facilities, submitting such plans to the carriers direct rather than attempting to coerce them, against their will, through the medius of the Interstate Commerce Commission.

One of the first steps to be taken in the formulating of such plans is to standardize a uniform removable body and arrange for the exchange of such bodies between different shippers, much after the manner in which lift vans are interchanged by moving and storage companies in different sections of the country.

## Swaps Trucks With Profit

(Continued from page 15)

of the trucks to cover more territory but to the small margin of profit on coal when it is sold at a uniform price for both near and far deliveries. The present delivery area extends as far south as One Hundredth street on Manhattan Island and includes all of the Bronx to the Yonkers line on the west and Mt. Vernon on the east. This territory is served from six waterfront yards, five in the Bronx and one in Manhattan. Stephens has found that to deliver to points outside of this territory, except in large orders, the delivery cost almost offsets the margin of profit, and for this reason he has set himself to the task of making the trucks most efficient in the old territory.

This has been accomplished by a very thorough system of maintenance and the use of time-saving loading devices at the storage yards. Stephens' responsibilities now extend to other branches of the business besides the motor vehicles, so that he is not able to devote all of his time to that work. Instead, he has a superintendent of trucks directly under him whose business it is to take care of all the details of maintenance and operation. Under him in turn, are an expert mechanic and helper in the day time, another mechanic and helper in the night time during the busy season of the year and one man who does nothing but keep cost records of the nine motor trucks and the 100 horses still maintained for the short-haul family trade of from 1 to 3 tons per delivery. While Stephens gives his orders directly through the truck superintendent, he often inspects the trucks himself, thus showing a personal supervision which keeps his men on the *qui vive*.

Each truck is completely overhauled and repainted once a year. This overhaul is practically a rebuilding, every part being inspected and new ones fitted if necessary. The motor is removed from the chassis and then taken apart and made as good as new, before it is replaced. This thorough yearly rebuilding, while it takes from 3 to 4 weeks and keeps the truck out of service for that period of time, is economical in the long run, because Stephens has found that his vehicles very seldom break down during the rush periods when a truck out of commission often disarranges the entire delivery scheme.

### Bodies Keep Trucks Moving

Besides keeping the trucks in A1 condition, Stephens has found that they must be kept in motion for the greatest possible time in order to effect the most economy. He has secured this in three different ways, as follows: 1—By pivoting the truck body at its rear end and thus keeping its elevation when elevated and enabling the coal to be chuted over a greater distance than if pivoted nearer the front end. 2—By the rear-end design of the body which permits the coal to be chuted parallel to the center line of the truck or across the street at right angles to it when the vehicle must draw up alongside the curb on narrow streets. 3—The use of loading hoppers or mechanical loaders. The method of storing coal in large pockets is very costly because of the expense of elevating it from the barges, so that wherever possible it is stored on the ground, thus eliminating the cost of pocket maintenance. Shoveling coal from the ground into a truck is very slow work, however, and Stephens soon found that he was losing money when it took from 20 to 30 minutes to load 6 tons of coal from the ground. To eliminate this costly delay, he installed a Haiss mechanical loader which is capable of loading a ton of coal per minute.

Besides being practical and agressive where his own trucks are concerned, Stephens seeks information and welcomes suggestions from other users of motor trucks. In his own installation, he constantly emphasizes the importance, first, of truck condition; second, of truck performance, and finally of truck expense, believing that the latter point is of importance only after maximum time in service and delivery results are obtained. He is a New Yorker, 30 years old, and a charter member of the New York section of the Motor Truck Club of America, in which organization he is an active worker.

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# Graphic Method of Comparing Cost Data and Determining Truck Economy

**Finding the Field of Trucks of Different Capacity**

**Editor's Note:**

REGINALD TRAUTSCHOLD presents in the article beginning on this page a method of analyzing cost figures for comparison with other data of similar nature on a basis of service rendered and a means of determining the relative economy of different types and sizes of vehicle in different fields of service.

His discussion is based on a set of hypothetical figures which are thoroughly reliable and therefore serve the purpose of comparison.

These figures, however, are only used as a hypothesis and are not claimed to be standard or average figures in any sense. THE COMMERCIAL VEHICLE has maintained and still adheres to the contention that cost figures are only useful where they are computed on a basis of service rendered and applied to the particular service, or one identical to it in all important features, from which the original data was secured.

The method which Mr. Trautschold presents may be applied to other figures by the formulas presented.

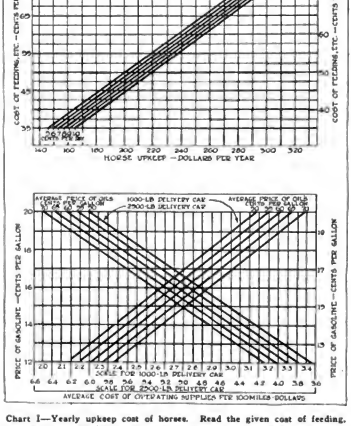


Chart I—Yearly upkeep cost of horses. Read the given cost of feeding, etc., on right or left scales, thence tn diagonal corresponding to cost of shoeing per day, then down to upkeep cost in dollars per year

Chart II—Yearly upkeep cost of trucks. Read the given cost of gasoline on right or left scales, tnence to diagonal correspending to coet of oil for one of the two capacities, thence down to one of the bottom scales for cost per 100 miles in dollars

**By Analysis of Cost Accounts and Reference Charts**

**By Reginald Trautschold**

COST is the acid test of motor truck efficiency and economy. No informed person doubts that in certain fields motor trucks are economical under proper conditions. Even the most sanguine must admit that there are also applications in which the commercial vehicle will prove more expensive than the horse.

Cost is the determining factor in most cases, but not always, for with many firms the only consideration is how to deliver the goods most quickly, cleanly, or with the most certainty. It may be assumed, though, that most buyers of trucks are prompted by a desire to economize.

Recognition of these facts has led to the practice of considering the costs of others in similar fields in determining the adaptability of trucks to the work in hand.

Cost figures, however, can be most misleading, and the same figures can be interpreted to produce diametrically opposite conclusions.

The need then is for accurate interpretation of cost data.

## Table I

### AVERAGE ANNUAL COST OF A 1-HORSE DELIVERY WAGON

1,000 lb. Capacity
Exclusive of Stable Expenses

| | | Government Figures | | Private Figures | |
|---|---|---|---|---|---|
| Initial Cost:— | | | | | |
| Horse | | $250.00 | | $250.00 | |
| Wagon | | 125.00 | | 125.00 | |
| Harness | | 30.00 | | 30.00 | |
| Investment | | $405.00 | | $405.00 | |
| | | | | | Per Annum |
| Interest on Investment | | | 6% | $24.30 | |
| Insurance | | | 2% | 8.10 | |
| Fixed Expenses | | | | | $32.40 |
| Labor, Average—Driver and Helper—$26 per week | | | | | 1,352.00 |
| Maintenance, Average | | | | | |
| Horse | 20% | $50.00 | 20% | $50.00 | |
| Wagon | 15% | 18.75 | 10% | 12.50 | |
| Harness | 15% | 4.50 | 15% | 4.50 | |
| Veterinary | | 4.02 | | 5.00 | |
| | | | | | 72.00 |
| Renewals, Average | | | | | |
| Harness | 15% | $4.50 | 15% | $4.50 | |
| Wagon | | | 10% | 12.50 | |
| | | | | | 17.00 |
| Horse Upkeep—Exclusive of stable expenses—see Chart I | | | | | |
| Feed, etc. | | $.474 per day | | $.40 to $.80 per day | |
| Shoeing | | .075 per day | | .05 to .10 per day | |

## Table II

### AVERAGE ANNUAL COST OF A 2-HORSE DELIVERY WAGON

2,500 lb. Capacity
Exclusive of Stable Expenses

| | | Government Figures | | Private Figures | |
|---|---|---|---|---|---|
| Initial Cost:— | | | | | |
| 2 Horses | | $600.00 | | $450.00 | |
| 1 Wagon | | ..... | | 175.00 | |
| 1 Harness, double | | ..... | | 50.00 | |
| Investment | | | | $675.00 | |
| | | | | | Per Annum |
| Interest on Investment | | | 6% | $40.50 | |
| Insurance | | | 2% | 13.50 | |
| Fixed Expenses | | | | | $54.00 |
| Labor, Average—Driver and Helper—$28 per week | | | | | 1,456.00 |
| Maintenance, Average | | | | | |
| Horses | 20% | | 18.33% | $82.50 | |
| Wagon | 15% | | 10.00% | 17.50 | |
| Harness | 15% | | 15.00% | 7.50 | |
| Veterinary | | $8.04 | | 7.50 | |
| | | | | | 115.00 |
| Renewals, Average | | | | | |
| Harness | 15% | | 15.00% | $7.50 | |
| Wagon | | | 10.00% | 17.50 | |
| | | | | | 25.00 |
| Horse Upkeep—Exclusive of stable expenses—see Chart II | | | | | |
| Feed, etc. | | $.948 per day | | $.70 to $1.50 per day | |
| Shoeing | | .15 per day | | .08 to .18 per day | |

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## Table III

### AVERAGE ANNUAL COST OF A 1,000-POUND MOTOR DELIVERY CAR

#### Exclusive of Garage Expenses

| | Government Figures | Private Figures | Per Annum |
|---|---|---|---|
| Initial Cost:— | | | |
| Car and Equipment | $1,400.00 | $900.00 | |
| Interest on Investment | 6% | $54.00 | |
| Insurance | 2% | 18.00 | |
| Fixed Charges | | | $72.00 |
| Labor, Average—Driver and Helper—$30 per week | | | 1,560.00 |
| Maintenance and Renewals, Average | | | |
| Car ... About 10% | 10-15% | $90.00 to $135.00 | |
| Tires, Average | $79.28 | 50.00 to 90.00 | |
| General Repairs | 67.34 | 50.00 to 95.00 | |
| Operation—Exclusive of garage expenses—see Chart II Consumption of Gasoline, 1 pint per mile | | | |

Today there is no question but that the horse and the motor truck has its own particular field of economic usefulness. These fields must overlap—the economic value of the horse being limited by the most severe service it can economically perform and the truck's field limited by the lightness of service that can be undertaken at a net cost not exceeding that which would be entailed should horses be used.

### Approximate Fields Can Be Determined

The extent of the fields must necessarily show considerable variation—conditions of service, type and conditions of roads, etc., all bear considerable weight on the meeting point—but the usual variation is not so great as to make it impossible to form some fairly reliable opinion as to when it would be more economical to employ the mechanically-propelled vehicle and when it would prove cheaper to rely on the horse-drawn vehicle.

Cost data represents one of the most perplexing problems to the student of motor truck efficiency because there is so much cost rubbish foisted upon the public which is not only wholly without value, but often seriously misleading; because thoroughly reliable figures from different sources disagree sadly due to the different conditions represented and the failure of one accountant to include all of the items which the other does; and because it is difficult to codify performance for a fair and direct comparison with expenditures.

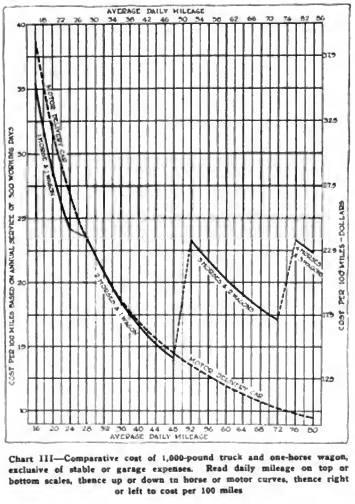


Chart III—Comparative cost of 1,000-pound truck and one-horse wagon, exclusive of stable or garage expenses. Read daily mileage on top or bottom scales, thence up or down to horse or motor curves, thence right or left to cost per 100 miles

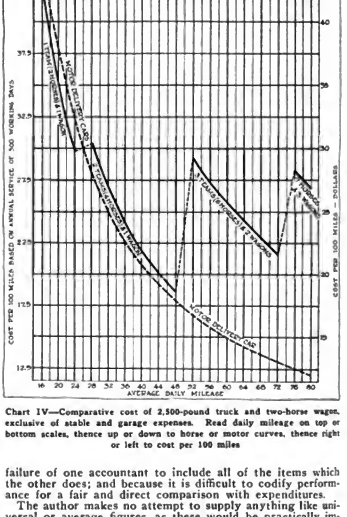


Chart IV—Comparative cost of 2,500-pound truck and two-horse wagon, exclusive of stable and garage expenses. Read daily mileage on top or bottom scales, thence up or down to horse or motor curves, thence right or left to cost per 100 miles

The author makes no attempt to supply anything like universal or average figures, as these would be practically impossible to obtain and of little value when acquired in consideration of the great diversity of figures of which such average figures would be the mean. He submits a method of comparing cost figures and performance data at hand so as to determine the relative economy of different forms of vehicle.

### The Government's Figures

As a basis for calculation a set of figures of unquestioned authenticity has been selected: a report by the Office of Public Buildings & Grounds of the United States made for the information of the committee on appropriations of the House of Representatives, early this year. It refers to the costs of two motor trucks and two horse vehicles. Of the two horse vehicles, one was a driving horse and carriage used by the officer in charge, and so is not considered.

Accepting, then, the Government data as a reliable basis upon which to work and making such corrections as private

## Table IV

### AVERAGE ANNUAL COST OF A 2,500-POUND MOTOR DELIVERY CAR

#### Exclusive of Garage Expenses

| | Government Figures | Private Figures | Per Annum |
|---|---|---|---|
| Initial Cost:— | | | |
| Car and Equipment | $223.00 | $1,600.00 | |
| Interest on Investment | 6% | $96.00 | |
| Insurance | 2% | 32.00 | |
| Fixed Charges | | | $128.00 |
| Labor, Average—Driver and Helper—$32.50 per week | | | 1,690.00 |
| Maintenance and Renewals, Average | | | |
| Car ... About 10% | | $160.00 to $240.00 | |
| Tires, Average | $155.05 | 62.50 to 94.30 | |
| General Repairs | 101.07 | 65.00 to 113.00 | |
| Operation—Exclusive of garage expenses—see Chart II Consumption of Gasoline, 1.9 pints per mile | | | |

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investigation among merchants of New York City indicate to be advisable, an analytical study has been made and recommendations arrived at that are well substantiated by results actually attained—recommendations in which theoretical and personal deductions are practically eliminated. In order that the study may be even more reliable and the data so presented as to allow modifications to meet any particular conditions, both the Government data and that obtained from private sources will be presented in the following discussion.

In general, comparisons should somewhat favor the motor truck, for though great progress has been made in the development of mechanically-propelled vehicles it is fair to assume that still greater progress will be made, while in the case of the horse drawn vehicle it is probable that about the best efficiency of the horse has already been realized.

### What a Horse Can Do

The carrying capacity of a one-horse delivery wagon is in the neighborhood of 1,000 pounds, and the average daily route for a year of 300 working days would in all probability be between 15 and 25 miles. The distance that could be covered during the average day by the car would be greatly in excess of that which could be covered by the horse, possibly the mean daily route of the motor truck might be as great as 80 miles. Such mileage would be altogether beyond the ability of one horse and wagon to cover, but it would be quite possible to cover even such a long route by one-horse delivery wagons operated in relays. Apportioning the route to several wagons would also have the advantage of greatly expediting deliveries; 2,500 pounds of merchandise could be handled by a heavy wagon drawn by a team and suitable employment of several teams and wagons would permit such a load to be delivered over an average daily route up to 80 miles in length, one truck being all that would be necessary to care for the maximum route of 80 miles.

For all practical purposes the housing of the motor truck and the alternate horse and wagon may be taken as the same. The expenses that govern the respective economic values of the two systems of delivery would then be, for horse drawn vehicles: initial cost, etc., labor, maintenance of horse wagon and harness, veterinary expenses, such renewals as are liable to be necessary, the cost of feeding the horse, etc., and of keeping him properly shoed; and in the case of the truck, initial cost, etc., labor, maintenance and renewals for the vehicle and tires, general repairs and the expenses that are entailed for gasoline, lubrication, etc., etc.

Considering first horse-drawn vehicles, the annual cost of such equipment is given in Tables I and II for 1,000-pound

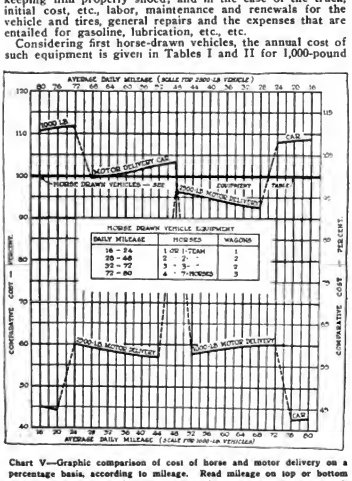


**Chart V—Graphic comparison of cost of horse and motor delivery on a percentage basis, according to mileage. Read mileage on top or bottom scale, according to capacity, thence up or down to motor curves, according to capacity, thence right or left to percentage scales**

## Table V

### AVERAGE ANNUAL OPERATING COSTS 1,000-POUND MOTOR DELIVERY CAR AND ONE-HORSE DELIVERY WAGON

**Exclusive of Stable or Garage Expenses**

| Average Daily Mileage | Year of 300 Working Days: 1-horse Wagon Yearly Exp. | 1-horse Wagon Exp. 100 mi. | Automobile—gasoline Yearly Exp. | Automobile—gasoline Exp. 100 mi. |
|---|---|---|---|---|
| 1 Horse and 1 Wagon— | | | | |
| 16 | $1,705.00 | $35.55 | $1,888.00 | $39.35 |
| 20 | 1,720.00 | 28.65 | 1,913.00 | 31.90 |
| 24 | 1,732.00 | 24.10 | 1,937.00 | 26.90 |
| 2 Horses and 1 Wagon— | | | | |
| 28 | 1,972.00 | 25.30 | 1,962.00 | 25.40 |
| 32 | 1,984.00 | 20.65 | 1,987.00 | 20.70 |
| 36 | 1,997.00 | 18.50 | 2,012.00 | 18.60 |
| 40 | 2,009.00 | 16.75 | 2,036.00 | 16.95 |
| 44 | 2,015.00 | 15.25 | 2,061.00 | 15.65 |
| 48 | 2,021.00 | 14.05 | 2,085.00 | 14.50 |
| 3 Horses and 2 Wagons— | | | | |
| 52 | 3,646.00 | 23.40 | 2,111.00 | 13.55 |
| 56 | 3,658.00 | 21.80 | 2,136.00 | 12.70 |
| 60 | 3,670.00 | 20.35 | 2,162.00 | 12.00 |
| 64 | 3,683.00 | 19.20 | 2,187.00 | 11.40 |
| 68 | 3,695.00 | 18.10 | 2,213.00 | 10.85 |
| 72 | 3,708.00 | 17.15 | 2,240.00 | 10.35 |
| 4 Horses and 3 Wagons— | | | | |
| 76 | 5,334.00 | 23.40 | 2,264.00 | 9.95 |
| 80 | 5,363.00 | 22.35 | 2,290.00 | 9.55 |

and 2,500-pound wagons, respectively. These tables contain both the average figures from the Government investigations and those obtained from extensive inquiries among New York City owners, which latter are further substantiated by opinions of those who have had a wide experience in the use of horses. The private figures include data collected from the experience of large department stores, small retailers, army operations and of various miscellaneous enterprises. In fact, they cover such diverse and extensive fields that they are probably more generally applicable than the government figures and will therefore be used in subsequent comparisons. Their close similarity to the government figures, moreover, guarantees their accuracy.

### Plotting Horse Costs

To facilitate the calculation of the annual expense of feeding and shoeing a horse, Chart I proves of considerable assistance. The vertical scale of the chart being the average daily cost of feeding, etc., the diagonal lines representing the average daily expense for shoeing and the horizontal scale giving directly the annual expense of horse upkeep. As an illustration best serves to show the convenience of this chart, it may be assumed that the annual horse upkeep is required when the average cost of feeding, bedding, etc., amounts to 50 cents per day and the average daily cost of shoeing is 10 cents. The lines representing these expenses—on the chart—intersect on the division of the horizontal scale reading 220—the horse upkeep charge is then $220 per year.

When taking up motor truck costs no two authorities seem to agree. Even on the question of initial expenditure there is a great diversity of opinion. Delivery cars are offered at all sorts of prices. The expensive ones possess certain advantages and can be counted upon for more reliability and uniformity of service, as a rule, than cheaper ones. Cheap cars, on the other hand, may sometimes give excellent satisfaction and prove both rugged and economical in operation.

The figures incorporated in Tables III and IV are not the best that have been reported nor are they the poorest; they are good average figures that should be obtainable nine times out of every ten. Maintenance and renewal charges naturally invite the greatest criticism. The government figures are considerably higher than those secured from private sources, it will be noted, yet the lower figures may be considered excessive by many.

### Truck Figures Conservative

For comparatively new cars which are kept in good repair and carefully used better results are frequently secured—many instances are on record that show remarkably low upkeep expenses—but when the average charges during the ordinary life of a commercial vehicle are figured in, the records listed under Private Figures will be found to be just about as good as can reasonably be counted upon in the great majority of cases.

The unavoidable breakages and general deterioration may apparently concentrate themselves, may take place during a

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## Table VI

### AVERAGE ANNUAL OPERATING COSTS 2,500-POUND MOTOR DELIVERY CAR AND TWO-HORSE DELIVERY WAGON

**Exclusive of Stable or Garage Expenses**

| Average Daily Mileage | Year of 300 Working Days: Horse-drawn Wagon Yearly Exp. | Horse-drawn Wagon Exp. 100 mi. | Automobile—gasoline Yearly Exp. | Automobile—gasoline Exp. 100 mi. |
|---|---|---|---|---|
| **1 Team and 1 Wagon—** | | | | |
| 16 | $2,054.00 | $42.75 | $2,232.00 | $46.50 |
| 20 | 2,099.00 | 35.00 | 2,274.00 | 37.90 |
| 24 | 2,144.00 | 29.75 | 2,316.00 | 32.15 |
| **2 Teams and 1 Wagon—** | | | | |
| 28 | 2,551.00 | 30.35 | 2,357.00 | 28.05 |
| 32 | 2,573.00 | 26.80 | 2,399.00 | 25.00 |
| 36 | 2,596.00 | 24.05 | 2,436.00 | 22.55 |
| 40 | 2,618.00 | 21.85 | 2,483.00 | 20.70 |
| 44 | 2,641.00 | 20.05 | 2,529.00 | 19.20 |
| 48 | 2,663.00 | 18.55 | 2,566.00 | 17.85 |
| **3 Teams and 2 Wagons—** | | | | |
| 52 | 4,592.00 | 29.45 | 2,608.00 | 16.75 |
| 56 | 4,615.00 | 27.50 | 2,650.00 | 15.80 |
| 60 | 4,637.00 | 25.70 | 2,692.00 | 14.95 |
| 64 | 4,660.00 | 24.30 | 2,733.00 | 14.25 |
| 68 | 4,682.00 | 23.00 | 2,776.00 | 13.60 |
| 72 | 4,705.00 | 21.75 | 2,818.00 | 13.05 |
| **7 Horses and 3 Wagons—** | | | | |
| 76 | 6,453.00 | 28.50 | 2,859.00 | 12.55 |
| 80 | 6,466.00 | 26.90 | 2,900.00 | 12.10 |

certain comparatively brief period, but they are nearly always apparent at some time and must be figured on just as veterinary charges must be made for the horse. Many horses may go years without need of a doctor's services and others may require frequent treatment.

The expenses for gasoline and oils are not included in the tables, as the prices for these supplies vary so frequently and to such a marked degree. Knowing the prices, however, these expenses are easily calculatd

### Truck Costs Plotted

Chart II enables the average cost of operating supplies for 100-mile travel of the vehicles to be quickly ascertained. For instance, with gasoline at 18 cents per gallon and the mean price of the lubricating oils 60 cents per gallon, the expense for the 1,000-pound truck would be $3 per 100 miles and for the 2,500 pounder $5.65—the reading of the chart being similar to that explained for Chart I.

With a working basis such as Tables I, II, III and IV, and Charts I and II, a comprehensive and reliable comparison of the respective economic value of small horse-drawn and mechanically-propelled delivery wagons is a simple matter, and any results derived and deductions made can easily be modified to meet any known conditions. In the following study, however, no attempt will be made to consider any but average conditions, as the final results depicted on Charts III, IV and V are intended to be those that can usually be counted upon. These charts and the data contained in Tables V and VI, from which the various curves are plotted, may then be taken as exemplifying the economic value of the two methods of delivery and indicating when the horse and wagon can be advisably depended upon and when it pays to adopt motor delivery.

### Where Horses Fail

When depending upon one-horse wagons of up to 1,000 pounds carrying capacity, daily deliveries could not be made over a route of 80 miles in length—both on account of the distance and the time that would be consumed in making the journey. In fact, with the average horse a route not greatly exceeding 25 miles would constitute a good day's service. For distances from 30 to 50 miles, two horses used in relays with one wagon would be advisable, from 50 to 70 miles would necessitate two wagons and three horses, while daily distances of 70 to 80 miles would call for the use of three wagons and four horses—the spare horse in each case relieving the regular horses assigned to the wagons.

Each wagon would require the services of a driver and in all probability another man who, for convenience, may be termed a helper. Estimating the annual expense of operation for the various routes from the tables and charts previously submitted, the average annual operating costs for one-horse delivery wagons, exclusive of stable expenses, are listed in Table V, together with the corresponding rates for 100 miles of operation. This table also includes similar data for 1,000-pound trucks when used in the place of the one-horse wagons, the charge for the driver for the truck being substituted for that of the horse driver.

The rates per 100 miles of operation are also graphically depicted on Chart III, the vertical scale of which is the rate and the horizontal measuring the average daily mileage covered by the vehicle. From this chart it is evident that the 1,000-pound motor vehicle is more expensive to operate than a one-horse wagon of the same carrying capacity over routes short enough to be cared for by a single horse—that is, for routes not exceeding 25 to 30 miles. For routes up to 50 miles or so, there is very little to choose between the wagon and the car. When the daily average mileage exceeds this limit, however, and more than one wagon is required to cover the ground properly, the motor truck proves considerably the more economical vehicle.

### Direct Graphic Comparison

The economic value of the 2,500-pound motor delivery car compared to that of a two-horse wagon of the same carrying capacity is somewhat different—see Table VI and Chart IV. The apportioning of horses in such service is as follows: One team and one wagon for routes of not more than 24 or 28 miles; two teams and one wagon for average daily routes from 28 to 48 miles in length; three teams and two wagons for distances from 52 to 72 miles; and seven horses apportioned to three wagons when 76 to 80 miles have to be covered. The graphic illustration of the rates per 100 miles of operation shown on Chart IV brings out the fact that with loads as great as 2,500 pounds the team and wagon are the more economical only when the average daily route is short enough to be cared for by one team. Just as soon as another horse or another wagon has to be used the truck proves the less expensive.

A still more convenient comparison of the relative economies of 1,000-pound delivery cars, 2,500-pound trucks and one- or two-horse wagons of corresponding carrying capacity is shown on Chart V. Here the cost of operating horse-drawn vehicles is taken as 100 per cent for all distances, while the comparative operating costs of cars is given in percentages of the wagon costs corresponding to the length of route. The convenience of this chart is best shown by a few simple examples and it will be assumed therefore that the comparative costs of operation of the two types of vehicles, of both 1,000 and 2,500 pounds capacity, is required over average routes of 10, 20, 30 and 40 miles per day, respectively. For 1,000-pound vehicles the horse and wagon is the cheaper for both 20- and 40-mile daily operation. For 60- or 80-mile routes the motor is the more economical. However, 2,500-pound vehicles are more economical than horse-drawn only for the short 20-mile daily trip, motor trucks being considerably the cheaper for average daily hauls of 40, 60 or 80 miles. The comparative costs in percentages for such service can be taken directly from Chart V, but for the sake of clearness and as an illustration of the method of reading the chart are listed in Table VII.

### The Horse's Last Stronghold

Though the horse would still seem to have a certain realm in which it proves its worth, even in this motor age, this restricted but extensive field can be acquired by the motor truck. Small delivery cars are needed that can be operated cheaply and, by the greater speed they are capable of developing, discount the greater carrying capacity of the slower-moving horse wagon capable of handling 1,000 pounds or so. The motorcycle with an attached carrying basket or box shows an attempt to meet the demands for a small mechanically-propelled delivery vehicle, but this fills the bill to but a limited extent, as its carrying capacity is limited to but a few hundred pounds and it is quite impracticable for packages that may be light but cumbersome. What is really required is a low-priced delivery car of about 500 pounds carrying capacity, equipped with a 10 or 12 horsepower motor in order to be economical in the use of gasoline, oils, etc. One that is easy on tires and capable of traveling from 20 to 30 miles per hour.

## Table VII

### COMPARATIVE COST OF OPERATING 1,000- AND 2,500-POUND VEHICLES

**Average Daily Mileage: 10, 20, 30 or 40**

| Capacity | Daily Mileage | Horse Vehicles | Motor Delivery Cars |
|---|---|---|---|
| 1,000-pound | 10 | 100% | 111.5% |
| | 20 | 100% | 101.4% |
| | 30 | 100% | 59.0% |
| | 40 | 100% | 42.7% |
| 2,500-pound | 10 | 100% | 108.5% |
| | 20 | 100% | 94.7% |
| | 30 | 100% | 57.9% |
| | 40 | 100% | 45.0% |

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# Motor Street Sweepers Save Time and Money

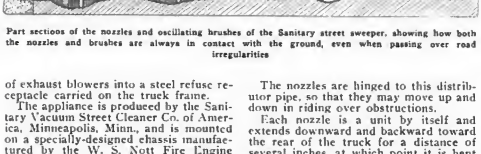
## Vehicles Made in Three Types, Pneumatic or Suction, Flushing or Revolving Broom With Pick-up Arrangement

STREET SWEEPERS may be divided into three separate classes, designated as pneumatic or suction, flushing, and broom with some pick-up arrangement. Since city officials have sought for means by which city pavements might be quickly cleaned in a practical manner and at a minimum of expense, many types of motor-driven apparatus have been designed.

The illustrations and descriptions on this and the following two pages of this article discuss three makes of motor-driven sweepers, one of the broom-and-pick-up type and two of the suction type. The designers of these three makes have endeavored to produce machines that are simple and yet perform all of the necessary sweeping operations, including the picking up of the dirt on all kinds of streets and under all conditions; that can be operated by one man and that are as cheap or cheaper than horse-drawn apparatus for the same work.

### Sanitary Sweeper Picks Up Load by Suction

Picking up its own load by suction, the Sanitary motor-driven vacuum street sweeper is self-contained and differs from the conventional type in that the revolving cylindrical sweeping brush is eliminated. In its place is used a series of small, straight-sided brushes which sweep the street in front of a row of air nozzles that suck up the dirt into a wind-chest. From there it is forced by means of exhaust blowers into a steel refuse receptacle carried on the truck frame.



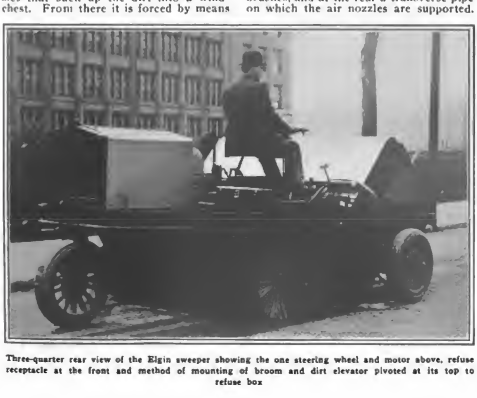
Part sections of the nozzles and oscillating brushes of the Sanitary street sweeper, showing how both the nozzles and brushes are always in contact with the ground, even when passing over road irregularities

The appliance is produced by the Sanitary Vacuum Street Cleaner Co. of America, Minneapolis, Minn., and is mounted on a specially-designed chassis manufactured by the W. S. Nott Fire Engine Co. of the same city.

The motor truck engine is placed partly under a conventional hood forward of the dash and partly under the floor of the driver's cab. The wind-chest is placed below the frame directly aft of the driver's seat and the exhaust blowers directly above on top of the frame. The steel body extends forward to the rear of the driver's seat but is under-cut at the bottom to make room for the exhaust blowers.

The wind-chest is made of sheet steel in the shape of a box with converging sides, the bottom being wider than the top. The ends of the chest flare outward and extend several inches beyond the wheels of the vehicle on both sides.

The lower edges of the chest are flanged and carry at the front a shaft to which are attached the sweeping brushes, and at the rear a transverse pipe on which the air nozzles are supported.



Three-quarter rear view of the Elgin sweeper showing the one steering wheel and motor above, refuse receptacle at the front and method of mounting of broom and dirt elevator pivoted at its top to refuse box

The nozzles are hinged to this distributor pipe, so that they may move up and down in riding over obstructions.

Each nozzle is a unit by itself and extends downward and backward toward the rear of the truck for a distance of several inches, at which point it is bent downward in a vertical position. This vertical portion of the nozzle is split into two parts, like an inverted Y, on the rear sides of which are placed small bearings that carry a rubber-tired wire wheel. This wheel extends part way through the Y and keeps the lower ends always the correct height above the ground. The bottoms of the Y do not extend down to the ground but are provided with short pieces of leather which touch the surface of the street.

#### Nozzles Under Spring Tension

Each nozzle is supported in a circular band attached to a rod which is bolted to an arm fixed on the shaft on the rear of the wind-chest. The rod is inserted within a spiral spring which is under tension, thereby always keeping the wheels supporting the nozzles in contact with the ground.

The shaft on the rear of the wind-chest which carries the arms supporting the nozzles is revolved by means of a lever in the driver's cab by which he may raise all the nozzles clear of the ground.

The shaft at the forward edge of the wind-chest carries a series of arms to each of which is connected a small straight-sided brush held in contact with the street surface directly in front of two of the nozzles by means of spiral springs under tension in the same manner as are the nozzles.

This shaft is driven by a chain from the jackshaft, the arms carrying the brushes being mounted on circular sleeves working in slotted cams on the driven shaft. In operation, the cams revolve with the shaft and cause the brushes to oscillate back and forth in front of the air nozzles, sweeping the dirt out of the crevices of the street surfaces so that it may be picked up easily by the suction of the nozzles.

The speed of oscillation and the pressure exerted by the springs on the brushes are regulated by the operation of two separate levers according to the condition of repair of the pavement, the kind of surface being cleaned and the speed of the truck. The brushes may also be lifted clear of the street in the same manner as are the nozzles when

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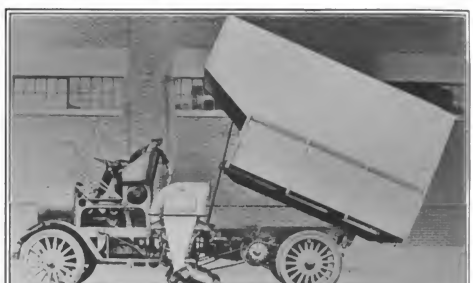
passing over streets which are not to be cleaned.

The wind-chest is extended above the truck frame on each side to inclose the two exhaust blowers which are mounted on the same transverse shaft. This shaft is driven by a chain from the layshaft of the gearset. Its speed is controlled by a set of levers in the driver's cab.

The wind-chests are connected with the outsides of the casings surrounding the exhaust blowers at the center, the dirt-laden air being expelled from the fans at the top peripheries into the steel refuse receptacle through two short neck-like portions of the fan casings. These parts of the casings are rectangular in section and are provided with gaskets at the points where they connected with the steel body. They are not bolted to the body, however, because the latter is of the dumping type and when elevated the apertures through which the air enters are higher than the fixed exhaust outlets of the fans.

The refuse receptacle or truck body is made entirely of steel and is closed at the top except for several small openings covered with cloth to catch the dust in the air as it passes out into the atmosphere. The body is elevated for dumping by means of a screw hoist operated from the truck motor.

In operation, the vehicle is run at a certain speed, according to the condition of repair and the kind of pavement being cleaned, the speed of the brush system and the exhaust blowers being regulated by levers in the driver's cab according to the same conditions. The oscillating brushes sweep the street surface directly in front of the air nozzles and the suction in these caused by the exhaust blowers suck up the refuse-laden air into the fans from which it is expelled into the large receptacle. There, due to the difference in volume between it and the wind-chest, the air expands, losing a greater part of its speed and force, and deposits the sweepings in the bottom. The air then passes off into the atmosphere through the cloth-covered openings, which extract any dust that it has not already deposited.



Side view of the Sanitary street sweeper showing shape of dumping body and position of exhaust blowers on top of the frame. These fans are enclosed within casings to which are attached windchests extending crosswise of the frame and carrying the series of nozzles. Note how the latter are mounted on small rubber-tired wire wheels at their lower ends

Only one man is necessary to operate the sweeper, the truck being handled in the ordinary manner by the driver, who manipulates three sets of additional levers, one for the speed of the fans, one for the speed and working pressure of the brush system, and one for the elevation of the air nozzles.

Both the sweeping-brush system and the air nozzles extend beyond the truck wheels on both sides, so that the gutters may be cleaned without scraping the wheels along the curb.

No water is used to lay the dust before sweeping, the suction caused by the fans being sufficient to pick up all dust and refuse without blowing it up in clouds.

Front and rear views of the nozzles and brushes used on the Sanitary street sweeper, showing wind-chest, fan casing and details of the mounting of each

## Elgin Sweeper Mounted on Three Wheels

Carried on three wheels, two in front and one in the rear, the Elgin motor-driven street sweeper, manufactured by the Elgin Street Sweeper Co., Elgin, Ill., is equipped with a cylindrical broom which sweeps the refuse into a bucket elevator which in turn deposits it into a receptacle carried at the front of the vehicle.

The motor and radiator are placed at the extreme rear, just forward of the rear wheel. From the motor the drive is taken through a dry-plate clutch to a three-speed gearset integral with the jackshaft and thence by double chains to the front wheels. The vehicle is steered through the rear wheel by a conventional steering gear and wheel mounted amidships. The use of three wheels instead of four permits the unit to be turned in a much shorter radius for rounding corners without leaving unswept that portion of the street.

The brush is set at right angles to the center-line of the vehicle and is carried on two slanting arms pivoted at the forward ends to the channel steel frame. These arms are supported at their rear ends on two stiff coil springs which allow the broom to be adjusted so as to give different bearing pressures on the street according to its character and state of repair. When the machine is to be run without sweeping, the brush may be lifted clear of the street by means of chains on either end operated by a lever convenient to the driver's reach. The brush is chain driven from an extra power shaft inclosed in the gearbox.

### Elevator Pivoted at Top

The elevator and the casing in which it is inclosed is hung on two pivots at the top of the refuse receptacle, which is rigidly connected with the frame of the vehicle at the front. The lower end of the elevator is supported on two wheels which run along the surface of the street, directly ahead of the brush. Like the broom, it is carried on two stiff coil springs at its lower end to allow of adjustment. When the unit is not sweeping it is lifted clear of the street by means of two side chains attached to the same hand lever by which the broom is raised.

The elevator is chain driven from the same shaft that drives the broom through two friction clutches, either one of which may be engaged at will by the driver, which provide two speeds for both the broom and the elevator.

The elevator is made up of two continuous side chains into which are inserted steel buckets at regular intervals, onto which the brush deposits the sweepings. Wooden safety pins are provided in the sprocket which drives the elevator and these will sheer off and prevent injury to the machine in the event of any unusual object getting into the elevator and causing it to stop. The bottom and sides of the elevator casing are made of sheet steel with a heavy pine top for rigidity.

After the sweepings have been deposited on one of the buckets of the elevator they are carried up to the top and deposited by gravity into the top of the steel refuse receptacle. This is a rectangular box carried half above the frame and half below with only one corner at the bottom, like a box stood

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on edge. This box is divided into two equal parts by means of a steel plate placed along the longitudinal center-line of the vehicle. It has a door at the lower front side for discharging the refuse. This is operated by means of side chains manipulated by a hand lever just forward of the steering wheel.

### Water Used to Lay Dust

Water is used to lay the dust before sweeping and this is carried in a 200-gallon cylindrical tank located beneath the frame just aft of the refuse box. The water is sprayed on the street at a pressure of 40 pounds to the square inch just in advance of the brush through a series of sprayer extending crosswise of the truck for the entire length of the broom. The water is kept under the correct pressure by the use of an air compressor driven from the motor and mounted above the frame to the left of the driver's seat.

The density of the spray to be thrown on the street is controlled by a hand wheel convenient to the driver and is determined by changing the openings of the sprayers and not by increasing or decreasing the flow of water through the feed pipe. The spray is capable of fine adjustment so as to just dampen the sweepings without leaving any free water upon the street.

The sweeping brush is 8 feet long and 30 inches in diameter and is made of hickory fiber bristles mounted in a grooved core. The elevator and the refuse box are the same width as the broom. The latter sweeps a path 8 feet wide and the box has a cubical capacity of 3 yards. The speed of the sweeper is from 4 to 5 miles per hour.

One man can operate the machine, which, after it has collected its capacity load of sweepings, may run to the dump or deposit its load at convenient points to be carted to the dump by other vehicles.

## Way-Cleanse Sweeper of the Gas-electric Type

Of the suction type, Way-Cleanse motor-driven street sweepers, manufactured by the Way-Cleanse Co., Sandusky, O., are made in two models, one self-contained on four wheels and the other of the tractor-and-trailer type with a four-wheeled truck carrying the operating machinery and a three-wheeled trailer with a large box body for the sweepings. The self-contained model is

Rear view of the trailer of the Way-Cleanse unit just before being dumped, showing how the sweepings form in layers in the body

smaller than the tractor type with less sweeping capacity and is designed for use in congested traffic.

Both models are of the gas-electric type, the power for both propulsion and the operation of the suction machinery being supplied by four-cylinder gasoline motors placed forward of the drivers' seats in semi-roman cabs.

Except for the use of the trailer, the tractor unit differs from the conventional truck type in that the former is propelled by a worm gear and the latter by side chains.

In each unit the gasoline motor is connected with a generator which furnishes power for operating the suction fan and for driving the cylindrical brush which sweeps the dust and dirt loose from the pavement. The brush is set obliquely to the truck frame, is 6 feet 7 inches wide and sweeps a path 6 feet in width.

### Suction Fan in Driver's Cab

The suction fan is mounted in the driver's cab to the left, the driver's seat being on the right. The intake of the fan is extended down to the front of the brush and at this point is spread out for the entire length of the latter so that the sweepings are sucked up simultaneously from in front of the entire brush.

Passing through the fan, the dirt-laden blast is expelled into a discharge casing connecting the exhaust outlet with the top of the deposit box carried on the trailer. This casing is made of sheet metal and is supported on the under side of the top over the driver's cab. At its rear end where it is connected with the deposit box, the casing is provided with a flexible neck which is slid over a conical-shaped pipe rigidly fixed in the box.

### Trailer Hitched Close Behind Tractor

When in operation the trailer is hitched close up behind the tractor, just like the tender behind a locomotive, and the flexible neck of the exhaust-fan casing slid over the pipe on the deposit box. A circular clamp is then placed around the flexible neck and tightened up against the pipe, making an air-tight joint. The flexible neck forms a non-rigid connection and permits of the necessary movement between the tractor and the trailer when turning corners.

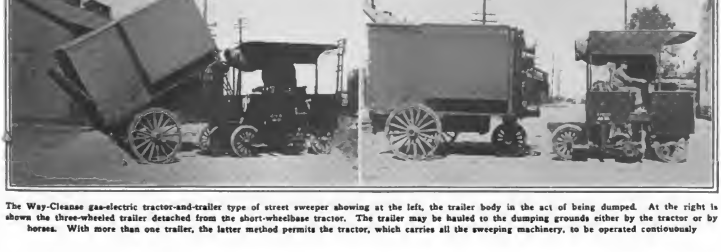
The trailer is mounted on three wheels, two at the rear and one at the front, the latter being positioned between the two rear wheels of the tractor when the trailer is joined to it. The body of the trailer is of the dumping type and is elevated by means of a chain hoisting device carried on the front end of the trailer and operated by hand.

The lower half of the rear end of the trailer body is hinged and is provided with gaskets around the edges to make the box air tight. After the body is elevated this hinged portion of the rear end is swung upward by means of a small rope and pulley, allowing the dust and dirt to slide out onto the ground.

The difference between the volume of the exhaust casing of the fan and that of the deposit box allows the dirt-laden air to expand considerably in entering the latter, at which time the dirt is precipitated in thin layers at the bottom.

### Helper on Tractor Unit

Both of the Way-Cleanse models are designed to be operated by one man, although the tractor unit is provided with a foot board on the right side of the tractor just forward of the rear wheel to carry a helper. When the machine is working on very uneven pavement, the holes in the pavement that are beyond the deflection of the broom are swept out by this helper. He also picks up any heavy litter on the street with broom and shovel and places it in a receptacle provided on the front end of the dirt box.



The Way-Cleanse gas-electric tractor-and-trailer type of street sweeper showing at the left, the trailer body in the act of being dumped. At the right is shown the three-wheeled trailer detached from the short-wheelbase tractor. The trailer may be hauled to the dumping grounds either by the tractor or by horses. With more than one trailer, the latter method permits the tractor, which carries all the sweeping machinery, to be operated continuously

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## FIFTH WHEEL TURNS SHORT

### Steering Front Axle Permits Shorter Turns Than Knuckled Wheels

To the Editor, COMMERCIAL VEHICLE: In your answer to the inquiry of F. A. Howard in the November 1 issue of THE COMMERCIAL VEHICLE, I was intensely interested in that part in which you stated that the tractor made by Merchant & Evans was able to turn in less than twice its wheelbase. Kindly elucidate.—Interested, New York City.

Fig. 1 shows the maneuver of such a vehicle as the M. & E. tractor, or indeed any vehicle which steers by means of a pivoted front axle of fifth wheel. This is because the wheels are permitted to swing as far around as need be. In a motor vehicle it is necessary that the front wheels drive to accomplish such a maneuver as depicted, because the front wheels are required to turn in opposing direction to the original course of the vehicle.

In explanation of Fig. 1, it will be noted that the front axle has been swung around from the straight-ahead position to a position in which the wheels are inclined toward the back of the vehicle, where they will follow a path as indicated in the line of circles. This will cause the rear wheels to be backed about the same turning point, bringing the vehicle eventually in a position transverse to the direction of travel. As the front wheels continue to travel, the vehicle will be pulled forward again and resume its normal course.

It may be held by some that this is not a true turning about a point, but is instead a backing turn, but inasmuch as the driving wheels continue to turn in the same direction, the effect is the same. The same effect would be produced if the same vehicle were backed to the transverse position.

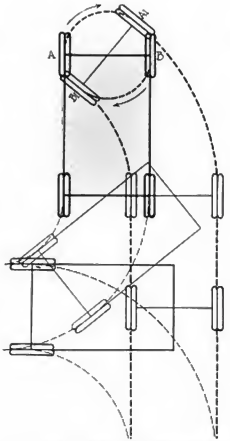


Fig. 1—How front-driven pivoted-axle truck turns around

## KNOCKS AT SLOW SPEED

### Heavy Engine on Alco Cannot Run Slow on Advanced Spark

To the Editor, COMMERCIAL VEHICLE: I have an Alco 3½-ton truck which has a pound in the motor. It appears only when running idle and at slow speed. It also disappears when the spark is retarded. Could this be a loose wrist pin or a piston slap or what? To me it is very puzzling and I would be very glad to find out the cause.—W. H. S., Blue Island, Ill.

The fact that the knock or pound appears only when running idle and at slow speed, but does not appear when running slow in gear indicates nothing, as of course at slow speed in gear, the motor has a wider throttle opening than at the same speed idle; also the inertia of the truck acts as an additional flywheel, so that it may be assumed that the trouble appears only when the minimum throttle opening is used.

That the retardation of the ignition results in the disappearance of the knock indicates that it is in all likelihood a spark knock. An engine in proper shape should not knock when idle, but nevertheless in heavy engines it often happens that with the throttle nearly closed and the spark fully advanced the motor will knock. The sound is a sharp click somewhat like the sound of one bottle being hit against another.

A piston slap, a loose wristpin or any other mechanical cause would be unaffected by changing the spark adjustment.

## CHARGE FOR DELIVERY

### Per Cubic Foot Best Basis Where Miscellaneous Goods Is Delivered

To the Editor, COMMERCIAL VEHICLE: Being located here in a town of 400,000 or more you can readily see the demand for express delivery, especially between this town and its suburbs.

We are considering very seriously and cautiously the idea of installing an express service between Newark and Morristown, a distance of 24 miles.

We are trying to ascertain in what way we should charge for cartage. Would you advise by the 100 pounds, and if so, how much per 100.

We intend putting in either a ¾-ton or a 1½-ton truck of good standard make, new.—Paul F. Devine, general manager, Washington Park Garage, Newark, N. J.

The venture should be profitable if there is not too much competition and if schedules are maintained so that the merchants in each city can learn to depend on the service. Whether the charge should be by the pound or by the cubic feet occupied depends upon the character of the goods delivered. If it is light and bulky, such as household goods, dry goods, flowers, etc., etc., the cubic foot is the proper basis. If it is heavy, such as groceries, crockery, newspapers or periodicals, etc., the charge should be according to weight.

If possible, a dual charge should be made to allow for all kinds of goods. The Adams Express Co. charges 75 cents per 100 pounds from Newark to Morristown, without restrictions as to size and with no reduction for less weight than 100 pounds.

A good scheme would be to charge say 60 cents per 100 pounds, splitting this charge into four, so that 25-pound packages or under go for 15 cents; packages from 25 to 50 pounds for 30 cents; from 50 to 75 pounds for 45 cents; and from 75 to 100, 60 cents, an additional 15 cents being charged for each 25 pounds additional. It would also be well to limit the size of packages to 1 cubic foot per 25 pounds by a charge of 15 cents per cubic foot. In charging for a package, therefore, the rate per weight and per size would both be computed, and the highest by either system charged.

To compete successfully with the express company you will have to give quicker and more direct service at the same cost or equal service at lower cost.

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## Acme, a Standardized 2-tonner

FIRST of a complete line of conventional trucks of medium price to be announced later by the Cadillac Motor Truck Co., Cadillac, Mich., the first, now ready, is of 4,000-pound size. A second is to appear shortly, it is said. The main features are:

| | |
|---|---|
| Capacity | 2 tons |
| Price | $2,000 |
| Wheelbase | 148 inches |
| Tires, front | 36 by 4 |
| rear | 36 by 6 |
| Drive | Worm |

As is the fashion, the power is derived from a unified plant, comprising a Continental motor and a Warner clutch and a gearbox, from which the drive is taken by a divided shaft and three universals to the Timken-David Brown worm-driven axle.

The power plant is three-point suspended direct from the frame. The motor has a bore of 4⅛ and a 5½-inch stroke, rating 27.2 horsepower by formula. It is governed by a Pierce centrifugal governor driven from the motor, set at 1,200 r. p. m., which with a gear-ratio of 7¾ to 1 on high gives something less than 17 miles per hour. The cylinders, of course, are cast in block with valves on the left and the crankshaft is carried on three bearings.

Water circulation is forced by a centrifugal pump through a finned-tube radiator in a sheet-metal case, whose tubes are vertical. This radiator is of Long manufacture. A Rayfield carbureter is employed, fed by gravity from a tank beneath the seat.

Ignition is supplied by an Eisemann magneto on the single plan, with fixed spark.

The Warner clutch is of the dry-disk pattern and the selective gearset affords three speeds. Torque and propulsion are taken by the springs, which are substantially flat. The frame is of pressed steel with integral front spring horns. Brakes are internal, both sets acting the full width of the same drums. Left steer and central levers are employed.

In the finish of the truck, the carefully-fitted and well-winged fenders are interesting, as is the cowled dash and louvred hood.

## The Columbia 2-tonner

FORMERLY the Kalamazoo, the Columbia 2-ton truck, now produced by the Columbia Motor Truck & Trailer Co., located in Pontiac, Mich., and successor to the Kalamazoo Motor Truck Co. of Kalamazoo, Mich., is an entirely new vehicle. It retains something of the Kalamazoo appearance, but differs in the final drive, now by internal gears instead of chains, as formerly.

The chief characteristic retained is the shortened wheelbase attained by placing the front wheels just in front of the dash, the hood projecting beyond them. This construction combines, in some degree, the advantages of the American and European forms of construction. General characteristics are:

| | |
|---|---|
| Capacity | 4,000 pounds |
| Price | $1,650 |
| Wheelbase | 146 inches |
| Tires, front | 37 by 4 |
| rear | 37 by 6 |
| Drive | Internal gear |

The motor and gearset are mounted separately. The motor has a bore of 4⅛ and a 5½-inch stroke, giving 27.2 horsepower by the standard formula. It is block cast with valves at the left and cooled by centrifugal pump circulation through a zig-zag tube, sheet-metal incased radiator, protected by a tubular bumper attached to the frame ends. The new Shakespeare carbureter in the 1¾-inch size is employed, fed by gravity from a tank beneath the seat. No governor is fitted. Ignition is derived from a Bosch single magneto with hand spark advance.

A cone clutch, inclosed within the flywheel drives by a jointed shaft to the three-speed selective gearset amidships, from which a single shaft transmits the drive to a Russel internal-gear-driven rear axle. This axle has no other connection besides the semi-elliptic springs, which thus are used for both torsion and propulsive action.

The frame is of rolled stock and is especially interesting in view of the

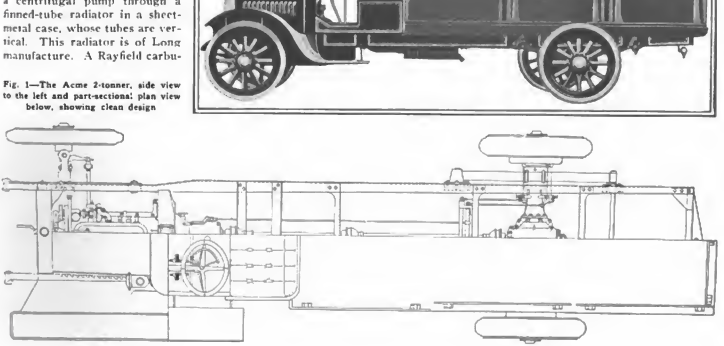

Fig. 1—The Acme 2-tonner, side view to the left and part-sectional plan view below, showing clean design

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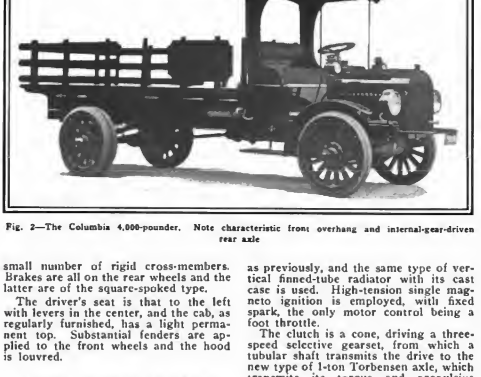

Fig. 2—The Columbia 4,000-pounder. Note characteristic front overhang and internal-gear-driven rear axle

small number of rigid cross-members. Brakes are all on the rear wheels and the latter are of the square-spoked type.

The driver's seat is that to the left with levers in the center, and the cab, as regularly furnished, has a light permanent top. Substantial fenders are applied to the front wheels and the hood is louvred.

## A Brand New Koehler

ENTIRELY new and different from the two-cylinder 1-ton Koehler, the four-cylinder model produced by the H. J. Koehler S. G. Co., Newark, N. J., is a thoroughly modern vehicle of the internal-gear-driven type. Consistent with the previous policy of this concern, the Koehler truck is produced in one model only, and also consistent with the previous Koehler policy, the price is a surprise—$895 with a standard body. Its features are:

| | |
|---|---|
| Capacity | 1 ton |
| Price | $895 |
| Wheelbase | 129 inches |
| Tires, front | 34 x 3 |
| rear | 34 x 3½ |
| Drive | Internal gear |

The motor is included in a unit power plant comprising an overhead-valve block-cast motor, clutch and gearset. The motor is 3½ by 5; 19.61 horsepower by formula, and is supported direct from the frame at three points. It is cast in block, the same casting including the upper half of the crankcase. The crankshaft is supported on three bearings. Valves are in the head, their mechanisms fully inclosed.

Thermo-syphon cooling is employed, as previously, and the same type of vertical finned-tube radiator with its cast case is used. High-tension single magneto ignition is employed, with fixed spark, the only motor control being a foot throttle.

The clutch is a cone, driving a three-speed selective gearset, from which a tubular shaft transmits the drive to the new type of 1-ton Torbensen axle, which transmits its torque and propulsive effort to the frame through the rear springs in the usual manner. A feature of the springs is that they are graded, each leaf being thicker than the one immediately below it.

Left steer and center control are employed, and the vehicle is especially interesting in its low floor. The body as shown in the illustration, Fig. 3, is included with the chassis at the price above stated, the top as shown being $40 extra.

## Two Superiors, Southern Made

HAILING from Atlanta, Ga., Superior motor trucks, made by E. G. Willingham's Sons, are produced in two models of substantially the same construction. They are of 1 and 2 tons capacity and moderately priced. Their features follow:

| | | |
|---|---|---|
| Capacity | 1 ton | 2 tons |
| Price | $1,350 | $1,800 |
| Wheelbase | 124 | 144 |
| Tires, front | 34 x 3½ | 36 x 4 |
| rear | 34 x 4 | 36 x 6 |
| Drive | Internal gear | |

The Beaver motors are incorporated with the gearset and clutch units in three-point suspended unit power plants, hung directly from the frames. Details of the motors are:

| | | |
|---|---|---|
| Capacity | 1 ton | 2 tons |
| Bore | 3½ | 3¾ |
| Stroke | 5 | 5 |
| S. A. E. h. p. | 19.6 | 22.5 |
| Speed, r. p. m. | 1,200 | 1,100 |
| m. p. h. | 17 | 15 |

Cylinders are cast in block on both models, and they are similar in other particulars. On each of the motors, whose principal difference is ¼ inch in bore, the valves are arranged in the head, and the crankshaft is carried on three bearings. Cooling is effected by thermo-syphon circulation on the 1-tonner and by centrifugal pump circulation on the larger model. Cellular radiators with sheet-metal casings are used.

Stromberg carbureters are employed, fed by gravity from tanks beneath the seats, controlled by a foot throttle only and governed by a Kramer suction governor. Ignition is supplied by an Eisemann waterproof magneto, on each model, with fixed spark, on the single plan. The control of the engine, therefore, is by one pedal only, and there are no levers on the steering column.

From the motor the driving line is through a dry-disk clutch and three-speed selective gearset to the Torbensen internal-gear axle by a single shaft with two universals. The clutch and gearset are of Fuller make. Hotchkiss drive is employed, eliminating radius rods and torsion members. A feature of the springing is that the rear springs are very flat in form and are tilted on their perches, so that their fixed front eyes are considerably higher than their shackled rear ones. This serves to cushion horizontal shocks sustained by the wheels when encountering obstructions. The front axle and springs are Sheldon products and Hess springs are employed in the rear.

The wheels are of Schwartz construction with square spokes, twelve in front and fourteen behind. The Foster steering gear is to the left and the gearshift and brake levers in the center. The finish of the front end has been carried out for appearance, the hood being louvred and the dash being cowled.

## Motor Trucks Prominent at the P. P. I. E.

(Continued from page 8)

hibits are confined to chassis exclusively, but there are a number of very modern and interesting examples of body work.

The Packard exhibit, which received the Grand Prize for passenger cars and the Medal of Honor for trucks, is par-

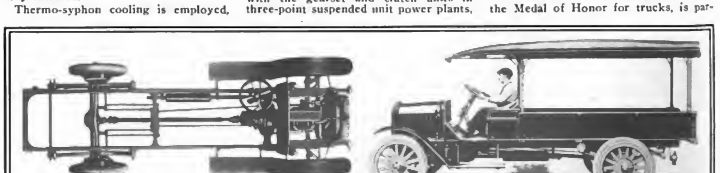

Fig. 3—Plan and profile of the new Koehler 1-ton truck, an entirely new design. Note simplicity of drive

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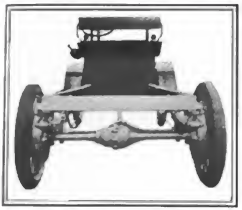

Fig. 4—Rear end of new southern-made Superior of 1-ton capacity

ticularly well located on the floor and features a 3-ton truck chassis, stripped, and the other a 2-ton worm drive equipped with stake body.

Making a special appeal to department store managers, the Walker Electric Vehicle Co. shows a 1-ton chassis equipped with a closed panel delivery body of splendid lines and highly finished, a duplicate of the bodies used by Marshall Field & Co., of Chicago. It also exhibits a 2-ton chassis without body equipment. Gaylord A. Freeman vice president of the Walker Electric Vehicle Co., is in charge.

The Menominee truck is represented by an 1,000-pound chassis and an open gearbox and rear axle such as this company features in its salesroom displays.

The Federal exhibit not only includes several models, but the exhibitors have gone to some pains to suggest by the body equipment a variety of uses to which trucks are put. The construction is exhibited in a 1½-ton chassis without body. The next machine is the 1½-ton equipped with chemical fire fighting apparatus by Peter Pirsch & Co., Kenosha, Wis. Another 1½-ton chassis has a rack body, built by B. Gheffoli & Co., San Francisco, suitable for use in the fruit or produce business. All of the above are chain-driven machines. The Federal company also exhibits a 1½-ton worm-driven hotel bus, carrying a Meister body, made in Sacramento, arranged for seating twenty-three inside and three on the front seat with the driver.

The Pacific Kissel Kar branch exhibits a Kissel 1½-ton worm-driven chassis.

Edison batteries occupy a large space and have a prominent display in one side of the automobile section of the Palace.

Moreland trucks, built in Los Angeles, are represented by one 4-ton chassis, a 2½-ton and a 1½-ton.

The Four Wheel Drive Auto Co., Clintonville, Wis., exhibits a 1½-ton chassis.

A Buick truck with an open delivery body is almost lost in the splendid array of Buick passenger cars.

Equipped with light delivery body and top, open sides protected by curtains, a Commerce ¾-ton is the only vehicle of that type represented.

The use of the motor truck in war is suggested by a timely exhibit of a Jeffrey four-wheel-driver with an armored body of the type supplied for ammunition service.

The Vim exhibit consists of one truck with delivery body.

The General Motors Truck Co.'s line of G. M. C. trucks makes a very strong exhibit with a 2,500-pound and a 3-ton chassis in electric models, while the G. M. C. gasoline trucks are represented by a 1,500-pound chassis, a 2,500-pound chassis and a 3½-ton gasoline and oil supply tender with full equipment of tank body, oil cans, etc.

Smith Form-A-Truck, made by the Smith Form-A-Truck Co., Seattle, exhibits its commercial rear end to be attached to Ford front axle, wheels and engine.

The White exhibit, which secured the Grand Prize on trucks and the Medal of Honor on open and closed passenger cars, shows in its truck section one ¾-ton open bus with combination express and passenger body, equipped with two seats back of the driver. It has armored pneumatic tires at the rear and straight pneumatic front. There is a 1½-ton chassis equipped with hotel bus body, a White Good Roads truck on steel wheels, a 5-ton power dump and a 3-ton and a 5-ton chassis.

As a suggestion of power and mechanical excellence and reliability the exhibition seems to be an impressive success. Any man who has been following the truck industry carefully and who has attended numerous truck shows and been in many salesrooms, gets the feeling, however, as he goes through this section of the exposition, that something very necessary and essential is lacking. Somehow the exhibits, though splendid and well arranged and grouped, do not have a thoroughly satisfying quality. It is only after careful reflection that it is discovered that the lacking element is the salesman.

An exhibition attendant, under his necessary limitations, is all very well, but a bare chassis certainly needs a salesman to link it up to the subject of transportation and individual needs and vitalize its existence and purpose.

Much might have been accomplished possibly in the way of suggesting action by the use of an elaborate and expensive arrangement of bodies, dummy loads, etc., and photographs of trucks in typical transportation endeavors. But if it were really the desire to change the beautifully-poised and calm presentation of the mechanical excellency of the motor trucks into a dynamic affair, such as seems required to represent transportation, one would really have to insist upon the presence of the genial, keen-minded fellows who know how to make a man build upon the sight of a truck a mental image of a larger business, of a vigorous pushing for trade in a wider territory and a closer analysis of the factors that produce a profit.

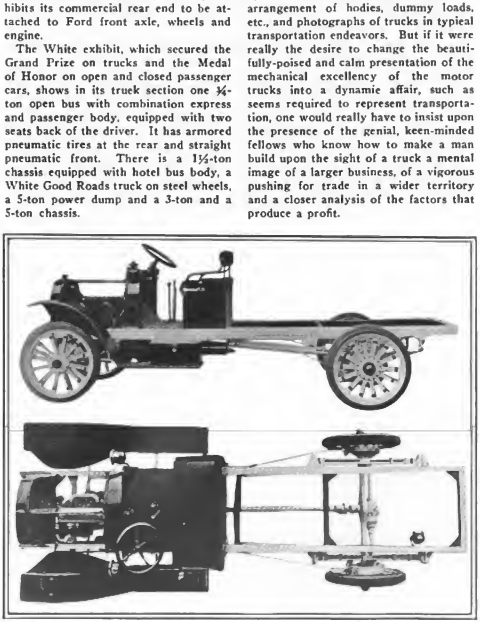

Fig. 5—Side and top views of Superior chassis, showing overhead-valve motor and Torbensen rear axle

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# Bus Bodies for City and Interurban Work

## Touring Car and Convertible Near-Side and Far-side Types

Fig. 1—High-speed twenty-two-passenger bus mounted on White 1½-ton chassis, used between Albany, N. Y., and Pittsfield, Mass.

### Thirty-two-passenger Bus Instead of Street Cars

Of the near-side or far-side type, according to the number of passengers carried in the non-rush or rush periods of the day, the thirty-two-passenger motor bus shown in Fig. 2 is one of several now in use in Miami, Fla. Although Miami did not go through the usual transition from village to town and from town to city, but had the distinction of having been organized as a city from the start, it had no street railway service and residents had to depend upon private means of transportation until the buses, one of which is shown in Fig. 2, were put into operation by Chase & Hardie.

Each bus is mounted on a 5-ton Saurer chassis and is equipped with a J. G. Brill trolley-car type of body, which is featured by provisions for either one- or two-man operation. The body has two doors, both on the right side, one at the front, just aft of the driver's seat, and the other at the rear.

During rush hours, each bus is operated by two men and the passengers enter at the rear door, which is controlled by the conductor, who collects the fares and gives the driver the signal to start by means of a roof bell, when the door is closed.

During non-rush hours, the rear door is closed, and the bus operated by the driver alone, the passengers entering and leaving through the front door. The fact that the chassis is of the right-drive type does not interfere with the ingress or egress of the passengers, because the front door is placed sufficiently to the rear of the driver's seat to provide for ample clearance.

Both front and rear doors are of the two-leaf, folding type, operated by means of a lever mechanism, in conjunction with folding steps. They are paneled with wired glass in the lower halves, with clear glass above.

Although the seating capacity is thirty-two passengers, eighteen more may be carried standing up, making a total capacity of forty persons. Those seated are carried on twelve separate seats, each accommodating from one to five persons. Beginning from the forward end, these seats are arranged as follows: Three crosswise seats on each side, each carrying two persons, except that nearest the front door, which accommodates one; then two longitudinal seats, one on each side, each large enough for five persons; then two more crosswise seats, just forward of the rear door, the one nearest the

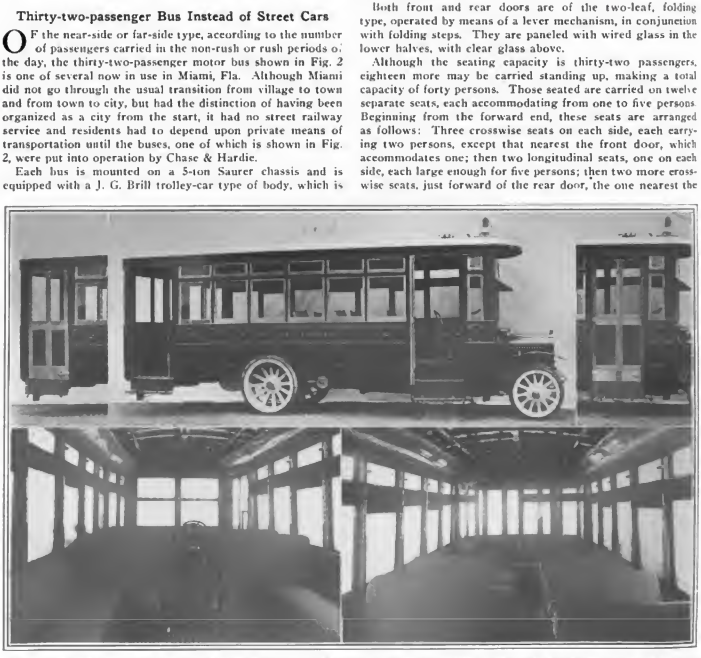

Fig. 2—Convertible near- and far-side bus body made by the J. G. Brill Co., Philadelphia, Pa., mounted on a 5-ton Saurer chassis, and used instead of street trolleys in Miami, Fla. The bus with doors open is shown in the center at the top, with closed doors at the left and right. At the bottom, to the left, interior view looking forward, and at the right, to the rear

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Fig. 3—Two twenty-passenger buses mounted on 2-ton Kisselkar chassis used in tourist service in the Yosemite valley

door for one person and that opposite it for three; and finally, two crosswise seats, one at the rear of the body for four passengers and another opposite it for three. These two seats only extend part way across the body, leaving space for a vestibule when the rear door is used to admit passengers.

The body has a wooden frame, suitably reinforced with steel, and weighs in all about 4,100 pounds. The interior of the bus is extremely light, the sides and ends being practically all window area. The side windows are of the double-sash type, the lower sashes dropping into pockets and the upper ones hinged at the top and swinging inward against bracket supports. The lower sashes of the front windows are arranged to raise, and that on the right is provided with a glass hood in way of the driver's vision. The rear windows are arranged to drop.

The overall dimensions of the body are 22 feet 11 inches length, and 7 feet 6 inches width, measured on the outside. The headroom is 7 feet.

## High-speed Twenty-two-passenger Interurban Bus

DESIGNED for high-speed service between Albany, N. Y., and Pittsfield, Mass., over the country roads of the Lebanon valley, the bus shown in Fig. 1 is equipped with a light, touring car type of body which seats sixteen passengers on four crosswise seats and carries six more on folding seats, two between each of the crosswise seats. This type of body is particularly adaptable for this kind of service because it enables the passengers to have an unobstructed view of the scenery on the route.

The body is extremely long, considering its type, being 16 feet in length, measured on the outside. It is equipped with a permanent top and side curtains with celluloid windows for use in stormy weather. Conventional-type running boards are used on both sides. Each of these is in two parts, one between the fenders on each side, and the other aft of the rear fender to give access to the rear seat, which is approximately 5 feet behind the rear axle.

The seats are entered from the running board through conventional side doors, one on each side, just forward of each crosswise seat. The folding seats for extra passengers are folded up and swung out of the way when the number of persons carried is less than sixteen.

The bus shown is one of several owned by the United Transportation Co., Inc., Troy, N. Y., and has been in use for over 2 years. Its average running time during that period has been about 25 miles per hour. To provide easy riding for its passengers at that speed, it is equipped with pneumatics in front and cushion tires in the rear. It is mounted on a White 1½-ton chassis.

The body was made by the Kingsbury-Leahy Co., Albany, N. Y. Its width, outside the rail, is 73½ inches. The width of the seats is 68 inches and their depth, 18 inches. The distance between the seats is 29 inches, which gives ample space for leg room and for the folding seats when these are in use.

## Twenty-passenger Buses in the Yosemite Valley

GRADES of 20 per cent are not usually negotiated by the conventional motor bus, but those shown in Fig. 3, a fleet of two in use in the Yosemite valley in California, each carry twenty tourists per trip through the Big Tree groves over roads in fairly good condition but which have maximum grades of 20 per cent.

The bodies fitted on these buses are of the sight-seeing type with five crosswise seats, each carrying four passengers. The space between the seats is open at each side. The height of the body floor above the ground is 30 inches, thus necessitating the use of two running board steps on each side to permit of easy access to the seats. The body has a permanent top, with side curtains for use in stormy weather. The outside dimensions of the body are, length, 16 feet; width, 64 inches, and height of top above cushions, 42 inches. The seats are 48 inches wide.

Each bus is mounted on a 2-ton Kisselkar chassis. They are owned by the Big Tree Auto Stage Co., of California, and are operated between El Portal and the Tuolumne grove of Big Trees in the Yosemite valley, making an average daily mileage of about 30.

## Racy-looking Twenty-passenger Bus

USED on a regular passenger line between Hazleton and Freeland, Pa., the twenty-passenger bus shown in Fig. 4 is fitted with a touring car type of body with a cape top. The front end of the body is rounded off at the front corners and the hood of the 1-ton Mack chassis upon which it is mounted is purposely sloped downward to break the abrupt line between the body and hood, thus giving the vehicle somewhat of a racy appearance.

The twenty passengers are carried in five crosswise seats, four to the seat. The first seat, in which the driver sits, is entered either from the left or right, as the truck is of the left-steered type, but the other seats are entered from the right side, thus permitting the bus to run up alongside the curb to collect its passengers.

Dummy doors are paneled off on the left side of the body in the way of the last four seats so as to give it a symmetrical appearance. The driver's door on the left side of the front seat enables him to get into his position behind the wheel without crawling over the legs of the three passengers who are carried on the front seat with him.

The body is made on a wood frame with sheet metal sides, doors and seat backs. The top is of the take-down type and can be folded and carried on the back of the rear seat. When in use, it is supported on ten stanchions, five on each side, one at the forward end of each seat. The seats are upholstered in genuine leather. A trunk rack is fitted at the rear to carry the luggage of the passengers.

The bus is owned by Setzer & Keller, Hazleton, Pa., and is mounted on solid tires all around, these giving easy riding qualities because of the good roads over which the bus operates.

Fig. 4—Twenty-passenger bus with touring car body running between Hazelton and Freeland, Pa.

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# Men and Makers

**STUDEBAKER CORP.,** Detroit, has just awarded a general contract to the Wisconsin Bridge Co. for the erection of a new building, 50 by 350 feet, adjacent to plant No. 3 in Detroit. The new structure will be used for making final adjustments on vehicles before they leave the plant. A three-story factory building of modern steel construction, 62 by 170 feet, is now under way. This is an addition to building No. 5-A, also at plant No. 3. Ground was broken last week for the erection of an addition to building No. 25-A. The cost of these three buildings is estimated at $75,000. A premium of several hundred dollars had to be paid to advance the delivery of the structural steel for the new buildings.

**Continental Motor Mfg. Co.,** Detroit, is rushing to completion its three new buildings at the Muskegon, Mich., plant. These consist of a four-story-and-basement building, 54 by 125 feet, for assembling and shipping; a new addition to the testing department and a four-story structure, 60 by 330 feet, to be devoted to the crankcase department, automatic screw machines, toolroom and stockroom. It is expected that the present force of 2,000 workmen will be increased to about 3,000 when the new buildings are completed.

**Gisholt Machine Co.,** Madison, Wis., manufacturer of turret lathes and other machine tools, has just occupied its new $40,000 addition. The new building has 25,000 square feet of floor space. Approximately the same space has been added by the leasing of adjoining factory buildings recently vacated by the General Electric Co.

**Commercial Auto Body Co.,** St. Louis, Mo., has moved its offices and salesrooms to its factory at Sixteenth and Pine streets, in the same city.

**Atlas Brass Co.,** Columbus, O., is planning the erection of a large addition to its present plant at south Park street, that city. The need for more space has been occasioned by greatly increased orders for brass parts used in motor vehicle construction.

**Clayton & Lambert Mfg. Co.,** Detroit, maker of sheet metal stampings, is erecting additions to its plant which will increase its working force by 500 to 1,000 workmen when completed. Additional machinery and equipment is being installed as rapidly as they are received. The business of the concern is said to have increased more than 50 per cent during the last few months. More orders are now on the company's books than ever before.

**Cutting, Armstrong & Smith Sales Co.,** Detroit, is now representing the Kalamazoo Spring & Axle Co., Kalamazoo, Mich.

**Booth Felt Co.,** Brooklyn, N. Y., has recently established a branch at Twelfth street and the Grand Trunk railroad, Detroit. The new branch is in charge of M. R. Sanborn.

**S. F. Bowser Co.,** Ft. Wayne, Ind., has just laid the foundation for a new three-story building. The basement of this building will be used as a vault for the safe-keeping of the company's valuables. Work on other buildings at the Bowser plant is progressing rapidly. The fireproof testing building is nearly completed.

**Master Carbureter Corp.,** Detroit, has appointed the Lincoln Garage, South Bend, Ind., distributer for Master carbureters in South Bend and vicinity.

**Studebaker Officials** who are making a tour of the branches of the Studebaker Motor Corp. scattered throughout the United States, held a business conference at the Hotel Astor in New York City on November 9. About 150 dealers under the jurisdiction of the New York City branch were present.

**R. T. Hodgkins,** sales manager for the Studebaker Corp., Detroit, has just returned to the plant from a 6-weeks' tour of Studebaker branches along the Pacific coast as far north as British Columbia.

**M. S. Bulkley,** formerly of the Bulkley-Rider Tractor Co., Los Angeles, Cal., maker of the Bulkley-Rider tractor, is now acting as agent for the Knox Motors Associates, Springfield, Mass., in the lower half of California. The Bulkley-Rider company has discontinued the manufacture of its tractors to push the sale of Knox tractors in its California territory.

**W. A. Murphy,** who recently secured the Colorado and Wyoming distributing agency for the Detroit light delivery vehicle, has now opened permanent quarters at 1608 Broadway, Denver, Col.

**H. Ross Maddocks,** who has the agency for Stewart trucks in Boston, Mass., and vicinity, has just closed an order with the Boston Clearing House Parcel Delivery Co. for twenty Stewart trucks.

**A. W. Wagner,** president of the Terre Haute Malleable & Mfg. Co., Terre Haute, Ind., retired from active participation in the affairs of the concern on October 30, last. His entire interests have been taken over by F. R. Benson and H. L. Arnold, who have been associated with him in the company. Mr. Benson became president and Mr. Arnold secretary and treasurer. There is no other change in the organization due to the retirement of Mr. Wagner and the business will be conducted as heretofore.

**J. Newton Gunn** succeeds E. S. Williams as president of the United States Tire Co. Mr. Gunn was formerly assistant to Col. S. P. Colt, president of the United States Rubber Co. Mr. Williams will hereafter devote his entire attention to the mechanical rubber goods business of the United States company.

**W. V. Logan** is now associated with the organization of the McGraw Tire & Rubber Co., East Palestine, O., in the capacity of assistant general sales manager. He was previously manager of the manufacturers department of the Goodyear Tire & Rubber Co. Mr. Logan has only recently returned from Russia, where he acted as a special agent for the Goodyear company. His efforts with the McGraw company for the immediate future will be confined to the opening of new accounts with passenger car and motor truck manufacturers in this country.

**Joseph A. Gallagher** has just been appointed manager of the Chicago branch of the American Taximeter Co., New York City, maker of the Jones and Popp taximeters, the Transimeter hub odo-

The Ward 750-pound electric which recently made an overland trip from New York City to Cleveland, O. At the left, it is shown negotiating a muddy stretch of road near Cleveland. At the right, having its battery charged at one of the wayside power stations while *en route*. It left New York City on October 6 from the Electric Show and arrived in Cleveland in time for the recent E. V. A. convention held there. Acknowledgments are due to the N. Y. Edison Co. for the photographs shown

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meter and the Recordograf, an instrument which gives a tape record of mileage, speed, starts and stops. Mr. Gallagher was formerly identified with the Autocar Co. and the Swinehart Tire & Rubber Co.

**P. G. Frazier,** formerly with the Philadelphia, Pa., branch of the Kelly-Springfield Tire Co., New York City, has been made manager of the St. Louis, Mo., branch of the same company. He succeeds H. L. Smith, resigned.

**G. W. Tiffany** has recently been appointed manager of the Detroit branch of the McGraw Tire & Rubber Co., East Palestine, O.

**S. L. Barrabee,** for some years a partner of the Brophy-Barrabee Co., one of the large accessory firms in Boston, Mass., has resigned and gone into the accessory business for himself at 133 Columbus avenue, in the same city.

**"Commercial Organizations in the United Kingdom"** is the title of a fifty-three page booklet just published by the United States Bureau of Foreign and Domestic Commerce, Washington, D. C., which should be of great value to American concerns seeking to increase their export trade, because it treats of the methods used by the United Kingdom in extending its trade to all parts of the globe. Its author is Archibald J. Wolfe, who has investigated the subject on the ground. The book also lists the various British chambers of commerce, their functions and methods, a detailed account of government aid to trade and a description of manufacturers' and employers' organizations in all the leading industries. It may be obtained from the superintendent of documents, Washington, D. C., at 5 cents per copy.

**"Commercial Organizations in Switzerland,"** recently published by the United States Bureau of Foreign and Domestic Commerce, reviews the history of the chambers of commerce in that country, explains the independent and official kinds of trade organizations and their functions, and gives particular attention to the Swiss Commercial and Industrial Assn., which comprises in its membership all Swiss commercial organizations of importance. The book should be of interest to American exporters who are seeking to expand their foreign trade. It is No. 101 in the Special Agents Series and may be obtained from the superintendent of documents, Washington, D. C., at 5 cents per copy.

Hauling a complete car load of baled cotton on every trip, the 5-ton B. A. Gramm chain-driven truck, shown above with its special platform body, is said to be the biggest truck ever built for cotton haulage. It is owned by M. Goldsmith & Bro., Charlestown, S. C., and is used to carry the cotton from the various boat wharves in that city to the Goldsmith warehouse. The truck body is 20 feet long and 7 feet wide, which is sufficiently large to carry twenty-three bales of cotton, arranged on end in two longitudinal rows of eight each, with seven bales placed crosswise of the truck on top

**200 Trucks Are Wanted in Spain,** according to one of the commercial attaches of the United States Department of Commerce in that country. Further information may be obtained from any of the branches of the Bureau of Foreign and Domestic Commerce or from the main office in Washington, D. C. The announcement was published in *Commerce Reports* of November 4, and is listed as No. 19100.

**Motor Street Sweepers Are Wanted In Ottawa,** according to the *Commerce Reports* of October 30, 1915, which states that experiments will be conducted by the city authorities next year with a view to purchasing vacuum street cleaners and pressure flushers on motor truck chassis. American manufacturers interested should address the city engineer, Ottawa, Can., for more detailed information. The city has 42 miles of pavement, mostly asphalt, which is cleaned at the present time by hand labor. No mechanical sweepers, street-car sprinklers or motor truck sprinklers or flushers are used in the city at the present time.

**Bosch Contracts** for magnetos have recently been closed by the Bosch Magneto Co., New York City, with the following concerns manufacturing motor trucks: O. Armleder Co., Cincinnati, O.; Palmer-Meyer Motor Car Co., St. Louis, Mo.; H. E. Wilcox Motor Co., Minneapolis, Minn.; United States Motor Truck Co., Cincinnati, O.; Hendrickson Motor Truck Co., Chicago, and the Alamo Mfg. Co., Hillsdale, Mich

**The Railroad Gang Drill** now installed at the Detroit plant of the Continental Motor Mfg. Co. and used for drilling holes in motor crankcases, can drill accuratcly 123 holes in a crankcase in 3 minutes time, whereas two men, by hand, would require 3 days. And furthermore, the chances are that the hand work would lack the accuracy of the machine drilling. The machine drills as many as forty-eight holes in one operation and can be adjusted so as to fit any style or size of crankcase.

**Fuller Catalog No. 24,** describing and picturing in full the various types of gearsets, clutches and controls manufactured by the Fuller & Sons Mfg. Co., Kalamazoo, Mich., is just off the press. It contains short descriptions of the two Fuller selective gearsets of the unit-power-plant type for trucks of ¾- to

Carrying a complete stock of leather findings and shoe store supplies, all of which is readily accessible, the 1-ton I. H. C. motor truck shown above is equipped with a special body with both side and rear doors which make it easy for the driver to get at the miscellaneous stock carried on interior shelves and trays. Note the driver's enclosed cab and the side and end doors which are split horizontally at the center, opening from the center toward the top and bottom. Also note the folding rear wheel guard which permits the opening and closing of the lower half of the side door. The truck is owned by Norman P. Shaffer & Co., Chicago, wholesale dealer in leather findings. It is used to cover the territory surrounding Chicago, going as far south as Hammond, Ind., and Chicago Heights; as far west as Aurora and as far north as Niles Center. It makes a trip covering these points at regular intervals and has been a big business getter, according to Mr. Shaffer, who states that his customers can depend upon being served on a given date and thus hold their orders for him instead of placing them elsewhere

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2-ton capacity; three different types of controls, forward and rear position, center, and separate type for outboard mounting; and several sizes of multiple dry-disk clutches. It also contains line drawings of S. A. E. standard taper- and square-end mainshafts and two suggested constructions of clutch and brake pedals. The book contains twenty-four pages. It is printed on white glazed paper, 6 by 9 inches, with a brown cover.

**"The Springs on Your Car"** is the title of a sixty-three page booklet just issued by the Detroit Steel Products Co., Detroit, which deals with the theory and manufacture of springs in non-technical language which can be understood easily by the layman. It takes up the principle of spring design, the requirements of springs for motor vehicles and then describes the manufacture of Detroit springs, showing illustrations of the various processes through which a spring must undergo from the steel in the rough to the finished product. It contains illustrations of some of the passenger cars and motor trucks on which Detroit springs are used. It is printed on buff paper, 4½ by 6, with a heavy paper cover in green. The treatise is one of the best and most instructive ever published relative to the theory, design and manufacture of motor vehicle springs.

**Sterling Instruction Book,** just issued by the Sterling Motor Truck Co., Milwaukee, Wis., for the care of its 2-, 3½-, 5- and 7-ton trucks, contains thirty-two pages of pertinent information arranged under fifteen heads and indexed so that the reader may easily find just what he is looking for. The first heading, Important General Facts, contains six subdivisions covering carrying capacities; speeds; cleaning; insnection; lubrication and annual overhaul. Section No. 2 treats of oiling; ignition systems; cooling system with a table of the composition of alcohol and glycerine non-freezing solutions; fuel system; governor care and the attention which the carbureter should receive. Other sections take up the clutch; rear axles; gearsets; steering gears; springs and the care of tires. A feature of the book is the lubrication chart published on the two center pages. This shows a typical plan view of the Sterling chassis with numbers for every part which requires oiling or greasing. These numbers are inclosed in various shaped forms according to the frequency at which each group of parts should be lubricated. The numbers are arranged in four vertical rows beneath the chassis view, with the name of each part after its particular number. The various sections are also well illustrated with both half-tone and zinc cuts.

Form 166

## Freezing Weather Precaution---1st Notice

GENTLEMEN:

The Autocar Company wishes to remind you of the approaching freezing weather, and unless proper precautions are taken to supply your cars with a suitable anti-freezing solution in the cooling system, the radiators and motors are liable to sustain much damage due to freeze up, thus plaeing the cars out of commission and causing considerable expense and annoyance to the owners.

**We cannot assume any responsibility for damage done by freezing of cooling system**

Denatured alcohol, which can now be purchased at all drug stores at a nominal price, when mixed in proper proportion with water, will withstand low temperatures, as indicated in the following table: (Approximate capacity of water system, 18 quarts.)

**20 per cent. solution**—One quart of alcohol added to one gallon of water freezes at about 16 degrees above zero.

**30 per cent. solution**—One and one-half quarts of alcohol to one gallon of water freezes at 5 degrees below zero.

**40 per cent. solution**—Two and one-half quarts of alcohol added to one gallon of water freezes at 20 degrees below zero.

**50 per cent. solution**—Four quarts of alcohol added to one gallon of water freezes at about 35 degrees below zero.

As the alcohol evaporates more rapidly than the water, alcohol must be added from time to time to keep up the strength of the solution. A convenient way to test the strength is by the use of a small glass instrument known as the "freezeometer" sold by auto supply houses at $1.50.

Respectfully submitted,

**The Autocar Company**

Ardmore, Pa.

Reproduction of card sent out to all Autocar owners recently—useful and timely

## Trailer Economy Makes Trucks More Efficient

(Continued from page 13)

wagons for the past 30 years, the first trailer designed especially for truck service was made in 1911, about 4 years ago. This was a development of the Troy horse wagon with plain bearings and steel tires, but did not meet with success because of the greater truck speeds as compared to horses. For this reason the Troy truck trailers now carried in stock are designed from the truck down rather than from the wagon up.

Each model has an all-steel frame, front and rear truck axles and solid-tired wheels carried on roller bearings. Three of the models are non-reversible and the other three reversible. The steering in each case is by means of conventional type steering knuckles and tie-rods attached to the rear end of the drawbar. The drawbar is very similar in design to that used on railroad trains.

The drawbar is made of steel and mounted on springs to take up the shocks in starting and stopping. It is bell-mouthed at the outer end where two pivoted links are used to connect each trailer with the one following. The bell-mouthed coupler and the links eliminate any climbing of the drawheads when the train is passing over uneven roads. Any one of the trailers in a train may drop into a rut 20 inches deep or pass over an obstruction of 20 inches without placing any additional strain on the trailer following.

Troy trailers are also furnished with steel tires for use on road construction work. Bottom-dump trailers are made on order with other special types.

### Ward

**Two-wheeler Featured by Spring Drawbar**

**Ward Motor Vehicle Co., Mount Vernon, N. Y.**

Differing from other two-wheeled trailers, the Ward 500-pounder is characterized by the use of a spring drawbar connection instead of the usual joint or pivot. The wheels and springs used are the same as those on the Ward Special of 750 pounds capacity.

### Watson

**Four-wheeled and Semi-trailer Bottom-dumpers**

**Watson Wagon Co., Canastota, N. Y.**

**Bottom-dumping,** Watson trailers are offered in two sizes, a 4- and a 5-tonner, each of which may be employed as a four-wheeled unit by the use of a fore-carriage or as a semi-trailer without it. Watson trailers are essentially a development of the Watson bottom-dump horse wagon which has been made by the Watson company since 1894. The first Watson truck trailer was made in 1913.

Both the trailer models are the same in design, differing only in the size of the load-carrying parts. They also incorporate all the dumping mechanism of the Watson wagon but are heavier throughout and are fitted with roller-bearing wheel boxes instead of plain journals because of the greater speed of the truck or tractor as compared to the horse.

The rear axle of each model is carried on two sets of double coil springs instead of the conventional semi-elliptic type used on most trailers, because the former does not interfere with the dump bottom or its operating mechanism. This type of spring was described and pictured in THE COMMERCIAL VEHICLE of May 1, 1914.

When furnished for use as semi-trailers, both models may or may not have a fifth-wheel device for attachment to the tractor, according to the desire of the purchaser.

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American Woolen Company's Federal at Providence, R. I.

## "Use Proves Economy"

American industries are taxing the capacity of the Federal Plant. "America First" is our policy.

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have guided thousands of American Business Men wisely to Federalized Transportation.

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12th St. and Grand Trunk R. R., Detroit, Mich., 'Phone, Market 5804

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Introducing our newest patent coal body with combined side and rear delivery. As pictured, body has gravity pitch built in. Elevates by hand 2½ feet. Load can be delivered in 4 minutes. Truck shown is 3½-ton Hurlburt. This is the most efficient and practical device we have ever built—the last word in coal body construction.

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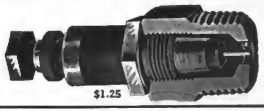

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*It Keeps Them In the "Safety Zone" Therefore:*

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—have won the confidence of their owners throughout the world by 5 years of matchless performance, service and durability.

RELIABLE DEALERS WANTED

The Agency Is a Valuable Asset

Capacity
2 Ton
2½ Ton
3 Ton
4 Ton

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Magneto included in the specifications is evidence of the superiority and reliability of that motor truck.

Be Satisfied Specify Bosch

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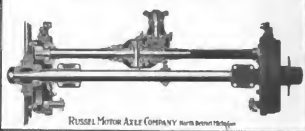

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Our entire engineering force is at your disposal.


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DETROIT USA

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THE BUDA COMPANY

BUDA MOTOR

"The part to buy the car by"

ESTABLISHED 1881

## "The part that sells the truck"

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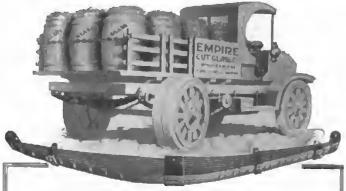


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Also Manufacturers of Overland and Willys-Knight pleasure cars.

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—the Selective Type, Sliding Clutch transmission, for all commercial and pleasure cars.

Individual Clutch System. All gears always in mesh.

No car is thoroughly efficient without a COTTA Transmission.

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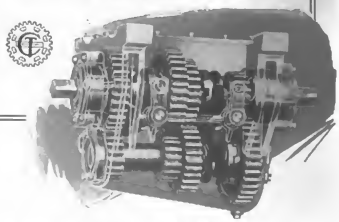




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# Quality

Many of the foremost manufacturers of pleasure cars and trucks are shrewd enough to discriminate between qualities and attributes.

*Quality is Perceived*
*Attributes are Ascribed*

Quality is that which makes or helps to make a thing what it is.

Fedders quality is what makes or helps to make Fedders Radiators the most efficient—it is a fact—something that is perceived; not merely an attribute we have ascribed to them.

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Incorporated
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is in a class by itself when it comes to mechanical perfection, ease of operation, and freedom from that ever troublesome repair bill.

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GRAMM-BERNSTEIN Motor Trucks embody in their design our own wonderful non-gear-stripping transmission, worm gear rear axle and self adjusting clutch.

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A TROY Trailer under the right conditions will at least double the earning power of your Truck. If the conditions aren't right, we will frankly tell you.

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Troy Trailers

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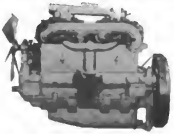

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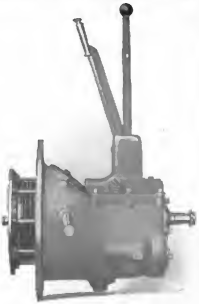
## Unit TRANSMISSIONS

Model "T U" ¾-1 Ton

Model "T U 2" 1½-2 Ton

*Particulars sent on request*



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are now used by

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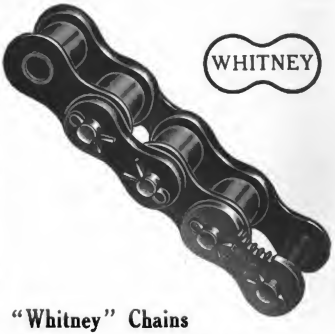


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are made by specialists in the foremost organization for chain design and manufacture in America. Our aim is dependability of service under hardest conditions, and our success in this is shown by the standardization of "Whitney" Chains by the leading motor truck makers of the country.

**The Whitney Mfg. Co., Hartford, Conn.**
**Chains—Keys—Hand Milling Machines**




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*The True Efficiency in the "Lavine" Steering Gear*

**A Gear With a Worm and Split Nut**

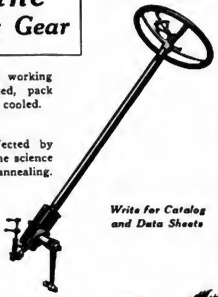
Not the usual worm and pinion device.

Split nut combination with trunnion gives double strength.

Each and every working part heat-treated, pack hardened, pot cooled.

Treatment effected by men expert in the science of metals and annealing.

*It is Lavine thoroughness which gives security*



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—writes a user of Cotta "Short Series" Transmissions, and he adds: "And at the same time is more easily operated than any other selective type transmission."

## Cotta "Short Series" Transmission

—is constructed for durability and reliability. Insures easiest engagement at any speed, under all conditions. Built strong and rigid. Best materials. Make it standard on your next truck.

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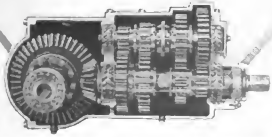



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PITTSBURGH MODEL ENGINE COMPANY

MODEL MOTORS

PITTSBURGH PA.




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**For Motor Trucks—Absolutely Quiet**

If you want a strong efficient unit drive that is specially designed for truck work, from one to three tons capacity, write us for complete information about the

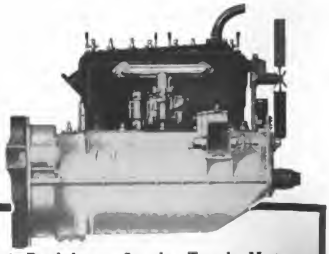
## Celfor
## Internal Gear Drive Rear Axle

It possesses marked constructional advantages which commend it to thoughtful designers, engineers and truck makers. We shall be glad to go into these in detail on request.

**Write today for details, catalog and prices**

**Celfor Tool Company**

**Buchanan** **Michigan**


A Real Long Stroke Truck Motor

## Wisconsin
CONSISTENT

Type TU
4 in. bore, 6 in. stroke.

Type UU
4½ in. bore, 6 in. stroke

Cylinders interchangeable.

Note these features.

CYLINDERS—Cast en bloc.
CRANKSHAFT—Four bearing, chrome nickel steel, 2 in. diameter.
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BEARINGS — Bronze, Fabrig metal lined.
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3 POINT SUSPENSION.

Write today for detailed specifications and illustrations.

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The United Truck
MADE IN
GRAND RAPIDS
USA
1½ TON TRUCKS
2 TON TRUCKS
3½ TON TRUCKS
5 TON TRUCKS
"UNITE WITH THE UNITED"
Continental Motor
Eisemann Magneto
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The Best That Money Can Buy
Brown-Lipe Transmission
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Gemmer Steering Gear
Write for Literature—Get Our Prices
United Motor Truck Company
Grand Rapids, Mich.


## The Wood Hydraulic Hoist

SOLVES THE DUMPING PROBLEM FOR MOTOR DUMP TRUCKS

Type "D" Heavy Duty Hoist

"Made in Detroit Only" by the

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Successors to WOOD HYDRAULIC HOIST CO., St. Paul, Minn.




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# Baker Electric Trucks

**Trucking by Electric power is not only the cleanest and easiest method but the least expensive. Facts and Figures will be quoted that corroborate this statement or better advise us you want a demonstration.**

**The Baker, R. & L. Company, Cleveland, O.**
Manufacturers of Baker and Rauch & Lang pleasure cars and Baker trucks.

# The Highest Efficiency

is attained in this worm-drive truck by powerful construction according to a correct four-wheel-drive principle which distributes and equalizes the driving stresses.

**MORTON TRUCKS, 1½ to 6 Tons Capacity**

in both regular type and four-wheel-drive are built to take hard usage and show permanent economy.

This serviceability is due to the thorough design of the vehicle as a whole and the use of the better standard parts. Study the specifications!

Write us for open territory and get into this four-wheel-drive business.

**Morton Truck & Tractor Co.**
HARRISBURG, PA.

CHASE

MOTOR TRUCKS

1000 POUNDS $1500 | 4000 POUNDS $2200 | 7000 POUNDS $3300

WORM DRIVE — WATER COOLED MOTOR
CORRUGATED FRAME — UNIT TRANSMISSION

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WATERTOWN, NEW YORK

CHASE YOUR DELIVERY

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HEAVY TRUCK SPRINGS
A SPECIALTY

THE CLEVELAND-CANTON SPRING CO.
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Ross Steering and Differential Gears

Will Help Sell Your Trucks

They are
STANDARD
on good motor truck construction

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our new complete line of fore and aft steering gears.

Enormous bearing surfaces
Perfect lubrication
Best material throughout
Finest workmanship

Built in the largest and newest steering gear factory in the United States.

*Write for catalog*

ROSS GEAR & TOOL COMPANY
790 Heath Street Lafayette, Ind.

TORBENSEN DRIVE
(PATENTED)
INTERNAL GEAR FORGED I BEAM

New Model Type "A" for One-Ton Trucks

We have embodied in the Type "A" rear axle all the improvements and refinements developed during years of experience with the internal gear drive.

NEW FEATURES

Differential housing in center of axle and divided along center line of jack shaft giving access to differential for inspection, adjustment or removal

Quick and certain adjustment of bevel gear and pinion without dissembling any part of axle.

Bevel gear double size giving greater range of gear ratio.

No right hand or left hand parts.

Internal gear rings larger diameter and double heat treated.

Grease retained in internal gears by means of shield which absolutely protects brakes.

Brakes larger and more powerful and brake rods carried inside of frame.

Jackshafts splined at both differential and pinion ends.

Bock taper bearings used on differential and drive pinion.

Strength and endurance increased with no additional weight.

Torbensen Gear & Axle Co.
E. 72nd St. and L.S. & M.S. R.R.
Cleveland Ohio




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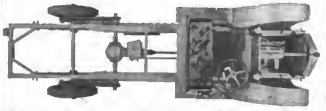
# SOUTH BEND



## Double Duty Trucks

—once put in service—always remain in service.

Whatever your business may be there is a SOUTH BEND DOUBLE DUTY TRUCK that will give you the utmost efficiency and satisfaction.

***Wisconsin motors, Warner transmission, Sheldon axles, Ross steering gear, Bosch ignition. Either chain or worm drive.***

SOUTH BEND DOUBLE DUTY FIRE APPARATUS in all cases more than performs its duty.

Attractive Dealer Proposition. Write us at once.

**South Bend Motor Car Works**
**SOUTH BEND, IND.**

# TRAILERS

We invite requests to design and submit estimates on all kinds of heavy trailers. Many trailer propositions call for a special job. You may have already found it so.

For years we have been building Watson five and seven-ton trailers for contractors and others. They have been successful. Their owners are satisfied.

Put your hauling problem up to us. Tell us what you want to haul; what tonnage you wish to carry; state the general conditions and see if we can offer a trailer that will meet the requirements.

Our long experience in building vehicles for heavy hauling may be of benefit to you. Let's get acquainted and see.

**WATSON WAGON COMPANY**
**Canastota, New York**

**Trailers for Motor Trucks and Motor Tractors**

***The World's Largest Builders of Dumping Wagons***

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## Save Money

Don't waste gasoline, oil, tires, electricity. Cut your truck operation costs down to the lowest possible figure by keeping mileage records.

# TRANSIMETER

**(Hub Odometer)**

Built for practical men by practical men who know the working conditions of truck operation.

Built to get accurate mileage records, and to get them easily and inexpensively.

## Guaranteed Indestructible

The heavy cast housing of the "Dreadnought" type prevents injury to mechanism from collision. No money lost on smashed instruments.

## Grease-and Dirt-proof

Special construction prevents oil or grease leaking from axle penetrating to inside of glass window. Figures are always clearly legible.

## Easy to Read

Figures remain stationary and upright—always easy to read. No danger of error.

Let us send you our booklet telling more about this practical and efficient hub odometer.

***Highest award at Panama-Pacific Exposition***

**Send for Booklet**

**AMERICAN TAXIMETER COMPANY**

**Mfrs. of the Recordograf and Jones and Popp Taximeters**

1765 Broadway New York City

Service stations in the following cities

*San Francisco, New Orleans, Washington, Chicago, Detroit Philadelphia, Seattle, St. Louis, Boston, Pittsburgh, St. Paul, Los Angeles*

Type for Fords

**Price $15**

"Dreadnought" Type

**Price $20**

# Annular Ball Bearings Reground

**ONE FIRM ONE SERVICE**

**ONE GUARANTEE**

**BACK OF**

**EVERY BEARING REGROUND**

**BY**

## Ahlberg Bearing Company

**2636 Michigan Avenue Chicago, Ill.**

**1790 Broadway, New York**
**93 Massachusetts Ave., Boston**
**1841 Euclid Ave., Cleveland**
**805 Woodward Ave., Detroit**
**325 West Pico St., Los Angeles**
**2831 Locust St., St. Louis**

# "RADIATOR INSURANCE"

Seamless Helical Tube Cooling Sections are guaranteed for the life of the motor on which they are installed. Helical Tube construction passes the most critical requirements of foreign and domestic engineers.

**Manufactured Only By**

## Rome-Turney Radiator Company

**Rome, N. Y.**




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# A New Car—THE BESSEMER

**Announce an Internal Gear 1-Ton Truck at**

**$975.00**

**Continental Motor—Bosch Magneto**
**Ross Steering Gear**
**Torbensen Internal Gear Rear Axle**

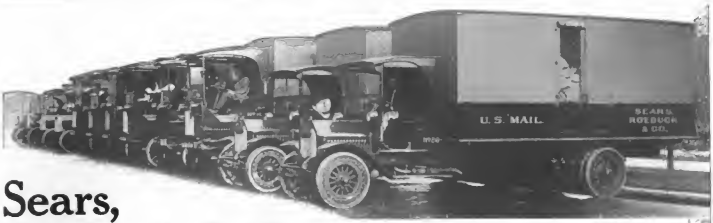
***Deliveries November 1st***

**The complete line of trucks as follows:**

| Model "G" 1-ton Internal Gear | Model "A" 1½-ton Chain | Model "D" 2-ton Worm | Model "E" 3½-ton Worm |
|---|---|---|---|
| $975.00 | $1800.00 | $2000.00 | $2800.00 |

**Write for our Dealers Proposition**

**Bessemer Motor Truck Co., Grove City, Penna.**




# Sears, Roebuck & Co.

get

**12,000 to 19,000 miles**

from

**GOODRICH WIRELESS TRUCK TIRES**

Because of good mileage—and good branch service—Sears, Roebuck & Co., Chicago, use Goodrich Wireless Tires on most of their Nelson-LeMoon, Alco and Peerless trucks.

Experiments with other makes of tires have not developed any tire which gives better all-around satisfaction than Goodrich.

Why not profit by the carefulness of Sears, Roebuck & Co., and save money on *your* trucks, too?

Write for *local proof* in *your* city.

**The B. F. Goodrich Company**

Service Stations and Branches in All Principal Cities — World's Largest Rubber Factory AKRON, OHIO

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# A TRUCK THAT PULLS THE LOAD

The above illustration shows a Duplex Four-Wheel Drive Two-Ton Truck performing an almost unbelievable feat. A flock of sheep which, together with the trailers, weighed over twenty tons, was hauled a distance of six miles over poor country roads. Due to the extremely rugged construction of the truck and its all-four-wheel traction, the run was accomplished without difficulty.

The Duplex is the peer of any truck built for strength and general efficiency. Made in two-ton and three-ton capacity. Fully covered by patents.

***We have an attractive dealers proposition. Get in touch with us immediately.***

**THE DUPLEX-POWER CAR COMPANY**

***Manufacturers of*** — **Four Wheel Drive Trucks**

**CHARLOTTE, MICH.**

# Audel's Gas Engine Manual

This volume gives the most valuable information respecting the construction, care and management of **Gas, Gasoline and Oil Engines, Marine Motors and Automobile Engines,** including chapters on **Producer Gas Plants** and the **Alcohol Motor.**

The work is divided into 27 chapters. Each chapter is illustrated by diagrams which make it a thoroughly helpful volume, containing 512 pages, 156 drawings, printed in large, clear type on fine paper, handsomely bound in rich red cloth, with gold top and title, measuring 5½ x 8½ inches, and weighing over two pounds.

The book is a practical educator from cover to cover and is worth many times the price to any one using a gas engine of any type or size.

**Price - - - - $2.00 Postpaid**

***Book Dept.*, The Commercial Vehicle**

**239 West 39th Street, New York**




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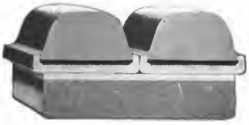
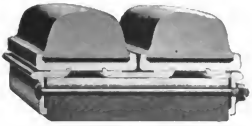
Single Pressed-On

Single Demountable



Dual Pressed-On



Dual Demountable

# Kelly-Springfield

## TIRES For COMMERCIAL VEHICLES

For maximum mileage at minimum cost, equip your trucks with Kelly-Springfield sectional Block Tires on the rear wheels and Kelly-Springfield Pressed-On or Demountable endless Tires on the front wheels. This is the ideal tire equipment for commercial cars. It will deliver record mileage even under unusually severe service conditions.

**Kelly-Springfield Tire Co.**
**Akron, Ohio**
**Branches in All Principal Cities**

# The 4 Essentials

to the building of a successful motor truck are:

**Simplicity** **High Efficiency**
**Low Maintenance** **Absolute Reliability**

The KREBS Motor Truck is built on a solid foundation of these four essentials.

It is simple, yet powerful in design and construction. It has a strong, simple motor and worm drive transmission. It is economical in maintenance. The KREBS Automatic Governor keeps control of the motor and gives just the right amount of gas to meet varying conditions.

By means of the worm drive, power is applied uniformly and without any loss through bevel gears and pinions.

The Automatic Governor gives highest efficiency by applying the power to meet every changing condition.

The KREBS Truck can be depended on to take care of every working condition imposed upon it with the least possible attention from the driver.

# Krebs

Made in 1½, 1, 2 and 3-ton models and with bodies to suit all trades.

We have valuable information for those who want to be "shown."

KREBS COMMERCIAL CAR COMPANY
CLYDE OHIO, U. S. A.
*"The Truck That Thinks"*

THE KREBS COMMERCIAL CAR CO. · CLYDE OHIO U.S.A.

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# Audels Automobile Guide

## With Questions, Answers and Illustrations for

## Owners—Operators—Repairmen

**Relating to**

The Parts, Operation, Care, Management, Road Driving, Carbureters, Wiring, Timing, Ignition, Motor Troubles, Lubrication, Tires, etc., including chapters on the Storage Battery, Electric Vehicles, Motorcycles, Overhauling the Car and an Appendix on Self Starters and Lighting Systems.

**By Gideon Harris and Associates**

**A BOOK WORTH HAVING**

550 Illustrations, 700 Pages. Flexible black leather binding; to carry in pocket. Price $1.50.

**"Understand Your Car"—Explained in the following chapters:**

1. Ready Reference Index.
2. The Automobile.
3. The Gas Engine.
4. The Cycle of a Gas Engine.
5. Brief Outline of Gas Engine Principles.
6. Cooling Systems.
7. Fuels.
8. Carbureters.
9. Ignition.
10. Timing and Balancing.
11. Gas Engine Operation.
12. Clutches.
13. Transmissions.
14. The Drive.
15. The Differential.
16. The Running Gear.
17. Tires.
18. Brakes.
19. Ball and Roller Bearings.
20. Lubricants and Lubrication.
21. Motor Cycles.
22. Electrics.
23. Electricity.
24. Dynamos and Motors.
25. Storage Batteries.
26. Methods of Circuit Changing.
27. How to Run an Automobile.
28. Overhauling the Car.
29. Starters and Starting Systems.
30. Electric Lighting and Wiring.

**Book Dept., The Commercial Vehicle, 239 West 39th St., New York**

# Audels Starting and Lighting of Automobiles 50 Cents

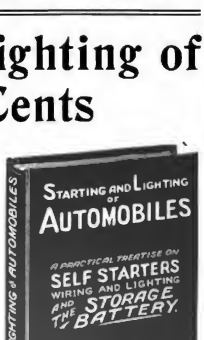
**This New Helpful Book**
tells all about the various forms of starting and lighting systems in use. Written and illustrated in plain language.

**Owners, Chauffeurs and Repairmen**
will find the necessary information for keeping in commission this part of their car, which if not understood may cause trouble.

**The Latest Improvements**
are shown, also directions for ***Installing and operating*** are given, making the book a ready reference for the up-to-date motorist.

**Valuable Diagrams**
are included, showing the wiring and circuit distribution of the various lighting and starting systems, with full explanation of ***how they work;*** the book also gives briefly and clearly the principles of electricity, dynamos and motors, electric gear shifts, etc.

**This New Concise Up-to-Date**
handbook, handsomely bound and finely printed, will be sent to any address postpaid for ***50 cents.***

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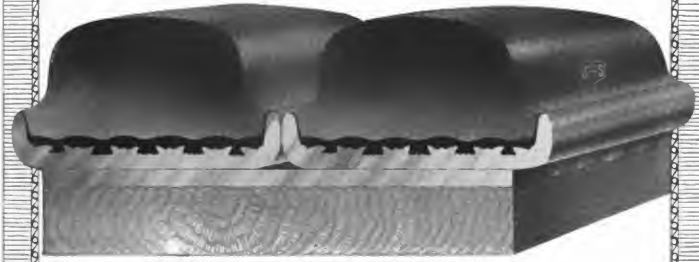
*The New*

# UNITED STATES TRUCK TIRE

**This new tire contains an extra large Volume of Rubber Which is Vulcanized under 800 Tons pressure by our new Hydraulic Press – the only Press of its kind in the United States.**



The new United States Truck Tire contains many startling improvements. Second in importance to the new 800 Ton Extra Pressure Process of vulcanizing is;

## A Larger Volume of Rubber

The new United States Truck Tire in every size contains a larger volume of rubber than is found in ordinary truck tires.

This extra quantity of rubber is an improved compound which has marvellous wear resisting strength and hitherto unknown resiliency.

The result is that the mechanism of the truck is given proper protection from jolts and jars. That's why the new United States Pressed-on Truck Tire means lower tire expense and reduced maintenance costs.

In addition to a larger volume of an improved rubber compound vulcanized under 800 Tons of Pressure, the new tire contains other vital improvements which will be described in future advertisements.

## United States Tire Company

**Broadway at 58th Street** **New York City**

**Branches in all principal cities give prompt, liberal and courteous service**

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# X_____ Garage Company, Inc.

Storing and Repairing of Business and Pleasure Cars a Specialty

(Address_____)

November, 10, 1915

The Commercial Vehicle
239 West Thirty-ninth Street
New York, N. Y.

Dear Sir:-

Received your letter of Nov. 9th in regard to data about a Delivery System which we wished to obtain.

We beg to state that we are very, very thankful for your kindness and for the thorough and complete information which you have forwarded to us. Being absolutely void of knowledge in this particular branch you can readily see how valuable your data will be to us.

We now feel we have a very good foundation to work upon when installing this system.

Again thanking you for your kindness and the information you have given us, we beg to remain,

Yours very truly,

X_____ Garage Co., Inc.,

(Signed)_____

General Manager

WPG/JMV

***(An actual letter, name on request)***



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# SKF

## Now Here's Another Advantage

The service you get out of the car depends vitally upon the elements which support the rotating parts—that is, the bearings. In worm drives you need a double thrust, self-aligning ball bearing to stand road vibrations and the action of the universal joint.

You know how important jewel bearings are to a watch. It's ust as important that your car should have good ball bearings.

S. K. F. Self-Contained double thrust bearings (No. 1700 Series) have two rows of balls and two aligning thrust discs which automatically adapt themselves to any shaft deflection or spring.

Then, too, S. K. F. Ball Bearings are made of Swedish Crucible Steel of the highest analysis.

Send us your specifications.

**SKF BALL BEARING CO.**
50 CHURCH STREET NEW YORK

No. 1700 Double Thrust Bearing, showing a quarter section removed

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# Success

Of all American industries, the manufacture of automobiles and commercial cars today best typifies commercial success. In little more than a decade it has leaped to second place among American industries, with an annual output worth many, many millions.

This success is due to no accident. It has been based upon the sound application of sound business principles—preeminently upon the fulfilling of fundamental human needs in an increasingly economical manner.

## Continental Motors

Nor is it due to accident, but to the same observance of the same business principles, that among all the manufacturers in this field, certain ones stand out by reason of their steady, consistent progress. Today 145 manufacturers of pleasure and commercial cars use one or more models of the Continental Motor; every one of these manufacturers that has been on the Continental books for the past three years, has enjoyed an enviable measure of prosperity.

If there is a royal road to success in the automobile industry, one sign-post on it undoubtedly bears the well-known trade-mark of 'Continental Motors.'

*Let it guide your way to motor-satisfaction*

**Continental Motor Mfg. Co.**

*Factories:* DETROIT—MUSKEGON

Largest exclusive motor manufacturers in the world.

CONTINENTAL MOTORS
Power for the Nation
AMERICA'S STANDARD




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# Commerce 1916

# AN OPPORTUNITY

**Here is the biggest opportunity of the 1916 season for the dealer** who is alive to the possibilities of a delivery truck measuring up to the highest requirements of this department of the commercial vehicle field—a delivery truck that meets every condition imposed upon it with the greatest efficiency, combining in its design the result of long years of specialization on one type of truck.

**The COMMERCE Truck for 1916—Series "N"—is a "complete truck"**—that is, complete in every detail—the initial cost representing the **final** investment to the purchaser. It is a successful combination of only the highest type of standard commercial truck parts united in a masterly design representing the results of six years of experience in the study of this one type of truck.

**DEALERS—Write us today—YOUR territory may be open**

Read carefully the summarized list of specifications:—

Capacity, 1,500 lbs.
Wheelbase, 120 in.
Tires, 34 x 4, non-skid rear, demountable rims
Speed, maximum—25 miles per hour
Continental Motor
Waterproof Eisemann Magneto
Unit Power Plant
Finned Cast Tank Radiator
Brakes, 16 in. diameter

These standard parts welded into a complete unit by our engineering skill make the COMMERCE Line of Trucks the product which must recommend itself to the wise dealer as the one best bet for the 1916 season.

Chassis furnished complete with Windshield, Hood, Fenders, Running Boards, Gasoline Tank, Dust Shields and Lamp Equipment, Tools, Pump, Jack and Tire Outfit.

**$875.00 F. O. B. Detroit**

MODEL "NC" with ample body of ash framing with steel panels. Handsomely finished in dark green and striping. Loading space 7 ft. long, 44 in. wide, 54½ in. high. All storm curtains. Designed for the grocer, department store and general trade where a high class body of the enclosed type is required. Rear doors or tail gate optional.

**Price, $975.00, complete, F. O. B. Detroit**

MODEL "NH," as illustrated below, with standing top and complete set of rolled waterproof curtains. Can readily be loaded and unloaded from the sides, saving time. Same loading space as above.

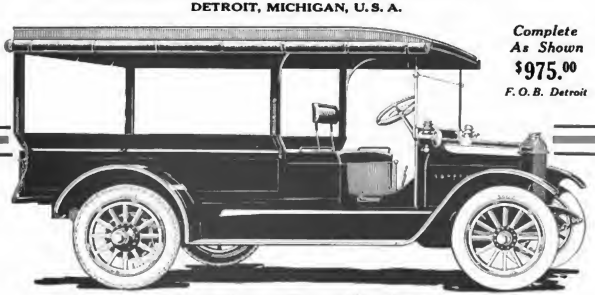
**Price, $975.00, complete, F. O. B. Detroit**

MODEL "NA"—Open express type with flare boards, driver's top, storm curtains, and tail gate. For quick delivery service.

**Price, $975.00, complete, F. O. B. Detroit**

## COMMERCE MOTOR CAR COMPANY

**DETROIT, MICHIGAN, U. S. A.**



*Complete As Shown*
**$975.00**
*F. O. B. Detroit*



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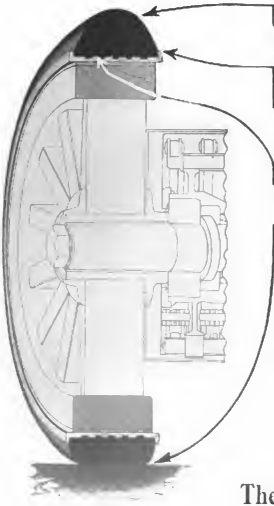
# McGraw
## TRUCK TIRES



**Normal shape of McGraw Pressed-on Tire** a deep, resilient tread of tough mileage-giving rubber, affording perfect cushioning effect.

**The McGraw Endless Steel Base — uniform in strength.** A rigid foundation for the tread and an absolute protection to the hard rubber sub-base. Note the Channels—how they prevent the tread from being chipped or ground off by curbs.

**Applied with a 200-ton Hydraulic Press,** the McGraw Channel Base Tire becomes as near a part of the actual wheel as is possible.

**As the McGraw Tire by actual test looks under compression.** Observe even in its changed shape, no portion of the tread extends beyond its base support; consequently side abrasion is prevented, and the entire tire is utilized in giving maximum traction and utmost mileage.

Made in Pressed-on and Demountable Types—Channel Base and Regular Steel Base Styles.

GUARANTEED 8000 MILES

*INQUIRIES SOLICITED*

## The McGraw Tire & Rubber Company
**East Palestine, Ohio**

New York, 1886 Broadway Chicago, 1442 Michigan Ave. Boston, 667 Boylston St.
Buffalo, 737 Main St. Kansas City, 1516 Grand Ave. Atlanta, 227 Peachtree St.
Dallas, 2004 Commerce St. Newark, N. J., 305 Market St.
Pittsburgh, 1006 Chestnut St. Philadelphia, 3645 Lancaster Ave.

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ACME
THE TRUCK OF PROVED UNITS

# 14 Selling Superiorities

Secure the early 1916 orders to be placed immediately by business firms in your territory for ACME 2-Ton Trucks.

The ACME has larger truck dimensions on 148-inch wheelbase—more power—50 per cent guaranteed overload capacity under normal conditions — extra spacious appearance — well balanced and artistic design—and fourteen proved units harmoniously combined, backed by leading American manufacturers.

| | | |
|---|---|---|
| Continental Motor | Timken Bearings | Long Radiator |
| Timken Worm Drive | Warner Clutch | Eisemann Magneto |
| Timken Front Axle | Warner Transmission | Rayfield Carburetor |
| Timken Rear Axle | Detroit Springs | Gemmer Steering Gear |
| Smith Pressed Steel Frame | | Pierce Governor |

In the ACME buyers get the benefit of the experience of thousands of truck users—save all experiment.

From starting crank to tail light there is not an experimental feature in the ACME—nothing but proved units.

*Obtain the immediate November and December orders.*

## Clinch the Agency—GET IMMEDIATE TRUCK BUSINESS!

Make the biggest, best class of truck buyers your boosters.

Our territorial proposition lays solid basis for permanent, profitable connection with this strong financial organization.

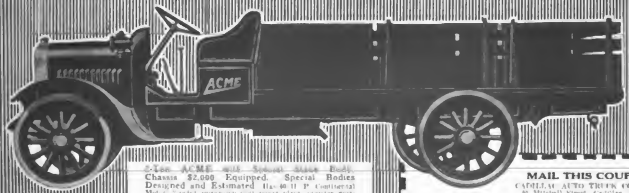
Act quickly to get this early 1916 business in next 30 to 40 days. Send Coupon for Agency Terms and Agreement—OR WIRE.

*Watch for Announcement of*
*¾-Ton Truck*

## Cadillac Auto Truck Co.

40 Mitchell Street

Cadillac Michigan




2-Ton ACME with Special Stake Body.
Chassis $2,000 Equipped. Special Bodies Designed and Estimated. Has 40-H. P. Continental Motor. Special suspension, more power, larger overall, and general dimensions, shown, standard.

MAIL THIS COUPON
CADILLAC AUTO TRUCK CO.
40 Mitchell Street, Cadillac, Michigan
Please send all the facts about the ACME 2-Ton Truck and your Agency offer for this territory.
Firm Name
Individual
Address
Present Agent for

C V.



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*Herewith is shown a fleet of Sheldon equipped trucks in France.*

*They are the product of the Sterling Motor Truck Company of Milwaukee, Wisconsin, who use Sheldon Worm Gear Rear Axles as well as Sheldon special truck front axles.*

*On the opposite page is an illustration of the 3-ton capacity (W. 30) worm gear axles used in these Sterling trucks.*

**It is interesting to note that but a small percentage of the remarkable increase in the output of Sheldon Worm Gear Axles is due directly to the influx of export orders that have been placed in this country during the past few months.**

# THE SHELDON AXLE A

*Makers of Springs and Axl*

**WILKES-BARRE**

**Chicago:**
**122 S. Michigan Blvd.**




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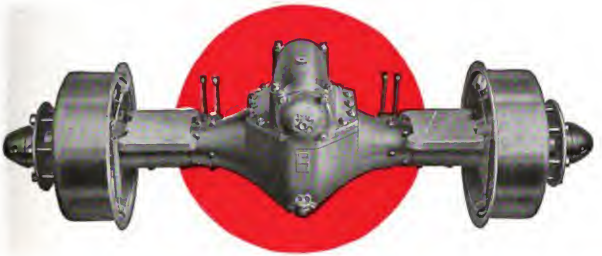
# Worm Gear Axles



**This increase in the first place is due rather to the rapidly growing conviction on the part both of truck makers and users that any type of drive other than worm gear is an actual compromise of efficiency—and in the second place to the realization that Sheldon design represents unquestionably the most nearly perfect application of this superior type of drive.**

**Worm gear as a type is now known to be the superior method of power transmission.**

**The use of ball bearings to carry both radial and thrust worm loads, and the use of the semi-floating type of axle in which to incorporate this ball bearing mounted worm have been established firmly as the superior methods in which to make use of the worm drive principle. It is no surprise therefore, as the truth of these facts has become known generally, that Sheldon as the original exponents of these principles should reap the reward of their foresight and progressiveness in the realization of a wonderful sales increase that has taxed our production capacity to maintain shipping schedules.**

**Anent this question of production we wish to assure our customers that as rapidly as new machinery and equipment can be bought and installed we are increasing our already enormous manufacturing facilities, that in the future as in the past we may be able to maintain our reputa tion for promptness of delivery as well as quality of production.**

## ND SPRING COMPANY

*Iore than 50 Years*

**PENNSYLVANIA**

**Detroit:**
**Woodward Ave.**

**San Francisco:**
**444 Market St.**



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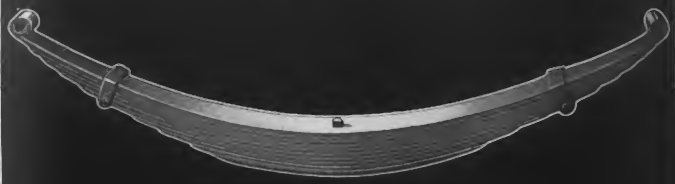
# "The Spring Is the Thing"



## MATHER

Scientifically Heat-Treated

## SPRINGS

designed to insure

## Maximum of Elasticity and Endurance

with

## Minimum of Vibration

Genuine made only by

## The Mather Spring Company

Toledo, Ohio

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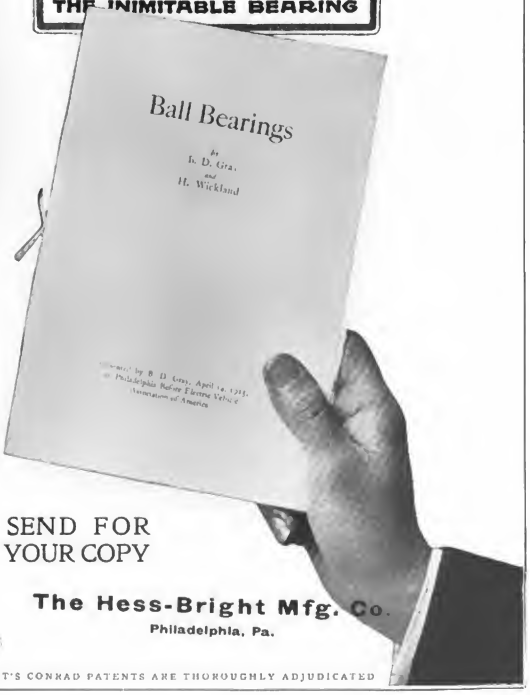
HESS-BRIGHT
THE INIMITABLE BEARING

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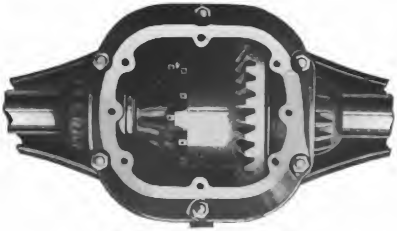

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The COMMERCIAL VEHICLE

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The COMMERCIAL VEHICLE
Read by Business Men

Vol. XIII December 1, 1915 No. 9

# Semi-trailers Get Grocer New Trade in Bigger Territory

## Cut Loading Time From 2 Hours to 5 Minutes—Tractors Pay Where Long Hauls Ousted Horses and Idle Time Made Trucks a Failure

By Joseph Husson

SEMI-TRAILERS have enabled a large Brooklyn, N. Y., wholesale grocer to reduce the loading time of his vehicles from 2 hours to 5 minutes. He could not expand his business as desired if he continued using horses. They could not make deliveries due to the increased length of hauls. Motor trucks proved a failure because they were held idle 2 hours in loading. Semi-trailers, loaded in advance, and coupled onto tractors in 5 minutes, have solved his problem.

The grocer is Thomas H. Roulston, who now has a chain of about 200 stores located in the Borough of Brooklyn and adjacent Long Island territory within a 60-mile radius. All of the stores outside of the confines of the Borough of Brooklyn have been made possible by the use of the motor vehicles. These, in turn, have been made possible by the adoption of the tractor and semi-trailer principle, for trucks of the conventional type were tried but proved a failure because of the idle 2-hour loading periods.

The Roulston company deals in all kinds of groceries, such as bottled goods, canned goods of all kinds, butter, eggs, coffee, tea, spices, etc., etc. These are distributed from the warehouse of the company located on Ninth street and Second avenue, Brooklyn, by horse wagons and tractor-trailer units. The final delivery to the consumer from the retail store is made in all cases by horses. Two- and three-horse wagons serve all the nearby stores in the Borough of Brooklyn, while the tractors deliver all the goods to stores outside of that area.

### Fleet of Six Tractors

The vehicular equipment of the Roulston company at the present time consists of 142 horses, six tractors and nine semi-trailers. The horses are used to haul the goods from the warehouse to the various stores in Brooklyn and for the final delivery in that area, eighty-eight one-horse wagons being used for the latter purpose. Additional horses are used for final deliveries at some of the stores outside the Brooklyn area. These are not maintained at the Roulston stables, but at stables nearest the store in each locality. The tractors and semi-trailers serve all of the stores outside of the Brooklyn territory, going out on Long Island as far as Port Jefferson on the north shore and Sayville on the south shore.

The Roulston company was formed in 1897 and one store was opened. Since that time store after store has been

View of Thomas Roulston's loading platform, showing superintendent's office in the center, large doors leading to warehouse and type of handtrucks used to bring the groceries to the platform edge

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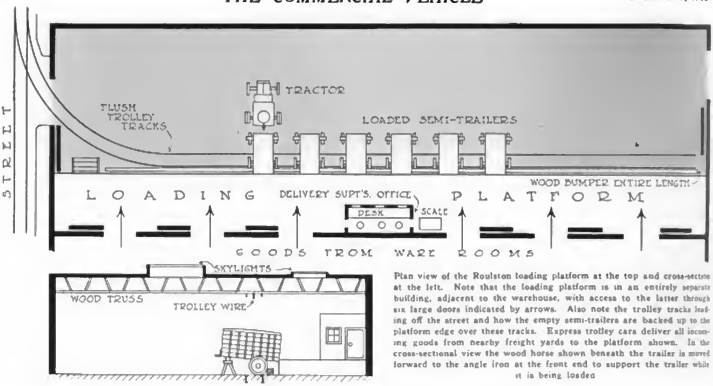


Plan view of the Roulston loading platform at the top and cross-section at the left. Note that the loading platform is in an entirely separate building, adjacent to the warehouse, with access to the latter through six large doors indicated by arrows. Also note the trolley tracks leading off the street and how the empty semi-trailers are backed up to the platform edge over these tracks. Express trolley cars deliver all incoming goods from nearby freight yards to the platform shown. In the cross-sectional view the wood horse shown beneath the trailer is moved forward to the angle iron at the front end to support the trailer while it is being loaded

added until now it has a chain of close to 200 stores. At first, horses were used exclusively for making all deliveries, both from the warehouse to the various stores and from the stores to the consumers. As the number of stores increased from year to year, the delivery problem became of more and more importance. This was especially the case because the new stores opened were farther and farther away from the warehouse and thus made the deliveries by horses more difficult due to the increased length of the hauls.

### Tractors Got New Trade

The newer stores were often opened up in new localities just being developed and settled, thus giving the Roulston company an entering wedge in that territory which eventually produced a large business increase.

In other of the more-thickly settled sections competition became keener and keener and the margin of profit less and less. As the stores were being opened farther and farther away from the base of supplies, the cost of haulage naturally increased. To keep pace wih its competitors, the Roulston company was forced to introduce economies into its delivery system.

The horse wagons then in use were doing about all the work they could. The horses could not be speeded up beyond their endurance. If one drives a horse hard one day and accomplishes more work than usual, he generally finds that the following day's work is less than the average, so that work done day in and day out over any considerable period remains fairly constant.

The Roulston company knew the total tonnage hauled by its various wagons but not the mileage, except in a general way. Accordingly, several of the wagons were equipped with recording devices of the tape type in the winter of 1911. Records from the tapes of these devices were obtained over a 10-month period extending well into the summer months, so that the results were indicative of average all-year conditions. The results obtained from these apparatus showed that the average mileage per wagon was 70 per week, or a little over 11 miles per day.

This was extremely low, even for a horse wagon, but was caused by the fact that it took from 1 to 2 hours to load. This, in turn, was caused by the great number of small articles which had to be loaded and to the fact that the wagon was held idle meanwhile.

Under these conditions it was but natural that the first motor truck tried by the company, in 1914, should prove a failure. Due to the slightly larger load which it carried, it took fully 2 hours to load instead of the 1½ to 2 hours with the horse wagon. For this reason, the truck was held up for 4 hours a day when it made two trips, so that out of a 10-hour day, only 6 were available for running, with a certain portion of this time lost in unloading at the various stores. Under these conditions, the truck could not realize its great ground-covering ability as compared to the horse.

### First Tractor Bought in 1914

The Roulston company got its first idea of the use of a tractor and semi-trailer by observing the tractor units of the

One of the five Garford tractors with a semi-trailer converted from an old horse wagon. The trailer load is about 6 tons

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Cranford Co., a nearby contracting concern, a description of whose equipment appeared in THE COMMERCIAL VEHICLE of May 1, 1914. It purchased its first tractor, a 3-ton Garford truck converted into a tractor, in March, 1914. That proved so successful that four others of the same size and make were bought before the summer of 1915. One of the new four-wheeled Knox tractors was also purchased and delivered in August, 1915, so that the fleet now consists of five Garfords and one Knox.

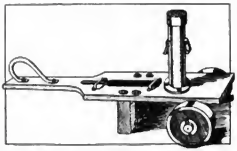
### Nine Semi-trailers Used

Nine semi-trailers are used in connection with the six tractors, the surplus of three enabling that number of empty trailers to be kept at the loading platform at all times, and loaded in advance of the return of the tractors, some of which make two trips per day. Three others are also loaded each afternoon after the return of the tractors on the shorter routes, so that on the following morning there are always six loaded trailers ready to be coupled onto the six tractors without delay.

Seven of the nine trailers have been converted from the former horse wagons and the remaining two built especially for tractor use. The former were strengthened generally in order to stand up under the greater tractor speeds. The front wheels and fore-carriages were removed and the upper halves of special fifth-wheels substituted in their places. The fifth-wheels were of the Shadbolt self-centering type, last described in THE COMMERCIAL VEHICLE of June 1, 1915. Larger-sized steel tires were also fitted on the trailer wheels, those now in use being 6 inches wide and 1¼ inches thick. The two trailers built by the Shadbolt Mfg. Co., Brooklyn, N. Y., especially for tractor use, are of the same design as the old horse wagons except for the use of heavier stock throughout, heavier wheels and improved plain bearings. The latter were pictured and described in the November 15, 1915, issue of this magazine

### Loading Platform in Separate Building

While the use of the tractors and semi-trailers has been responsible for the great saving in loading time and the corresponding increase in the actual running time of the vehicles, the lay-out of the loading platform at the warehouse has enabled the system to be maintained efficiently and without interruptions. The special feature of the loading platform, besides its physical characteristics, is the fact that it is an entirely separate building, planned and built long before the warehouse was erected. It was formerly used as a storehouse. It was purposely located on a plot adjacent to that on which the warehouse was to be built, so that when the latter was put up all that had to be done to join the two was to cut doors in the wall of that side of the building on the line between the two plots. Thus, the loading facilities were planned before the main building was erected. This is a practice which a great many other concerns could follow with profit to themselves, for many of the



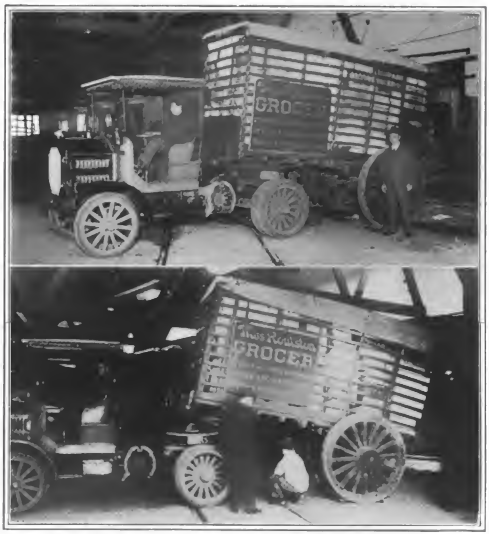
Sketch of small two-wheeled carriage carrying the hydraulic jack by means of which the semi-trailers are coupled and uncoupled

latter-day structures, while modern in every respect in their interiors, sadly lack facilities for getting the goods into or out of them.

The Roulston warehouse is a four-story structure. The three lower floors are used for the storage of the various kinds of groceries, the perishable products, such as butter, lard, eggs, etc., being kept in large refrigerators. While the ground floor is used exclusively for storage purposes, portions of the other two are used for bottling catsup, vinegar, etc., and packing rice, hominy, etc. The top floor is devoted to the coffee-roasting department, with the remainder given over to the general offices. Two large elevators are used to take the goods from stock to the ground floor.

Small four-wheeled handtrucks are pulled from place to place on each floor and the required goods loaded on them, after which they are taken to the ground floor on either of the elevators and then pushed out on the loading platform, where they are unloaded directly into the waiting semi-trailers.

The loading platform runs along one side of the building for its entire length, as shown in the plan view given on page 6. The goods is taken from the ground floor of the building out onto the loading platform through six large sliding doors, located three on each side of the delivery superintendent's office, at the




Thomas Roulston's four-wheeled Knox tractor, shown at the top just before leaving with a loaded semi-trailer carrying 6 tons, and at the bottom, in the act of coupling onto the trailer. In the latter, note that only one jack and one man are necessary. Also note the position of the jack near the center of the trailer instead of at the front. The Shadbolt self-centering fifth-wheel mounted on the tractor frame is also shown

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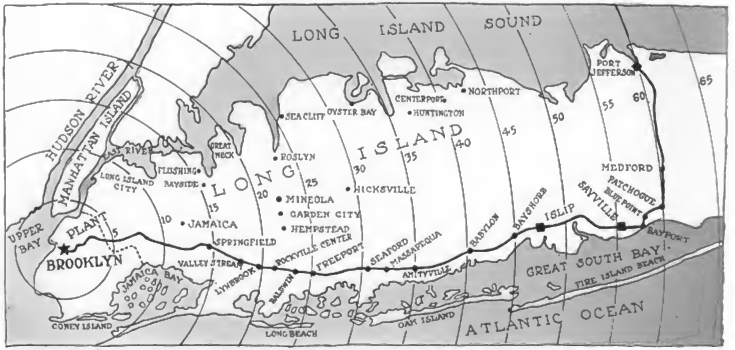


**Map showing route of Garford tractor on trip to Islip, Sayville and Port Jefferson which was observed by a representative of THE COMMERCIAL VEHICLE, and the log of which is given in the table on the opposite page. The heavy block line indicates the route traversed. The star represents the Roulston plant; the small black circles on the route line, the villages passed through and the small black squares, the points at which deliveries were made. The dashed line indicates the boundary line of the Borough of Brooklyn. All the Roulston stores outside of this boundary are served by the Roulston fleet of six tractors and nine semi-trailers. The concentric circles are 5 miles apart, drawn about the plant as a center, and indicate the great increase in territory which the tractors have secured**

center. The latter is all windows in front and sides, thus giving the superintendent a clear and unobstructed view of the entire platform without leaving his office.

The semi-trailers and the horse wagons used to deliver goods to the nearby stores are backed up against the edge of the platform, which is just flush with the floor of the vehicles, so that unnecessary lifting on the part of the loaders is obviated.

All the goods is brought from the various floors to the loading platform on handtrucks by means of the two elevators, no gravity chutes being employed and no industrial trucks used. While at first glance it would seem that both of these apparatus might prove beneficial by the saving of time, other operations not now necessary would have to be performed and which, in the opinion of the Roulston company, would more than offset the advantages accrued.

### How Goods Reaches Platform

Now, when an order is received in the main office from one of the stores, it is made out in duplicate, one copy going to the delivery superintendent, who dispatches a man with a handtruck to the various floors to collect the different articles of which the order is composed. These are packed loosely in old barrels or packing boxes to avoid the handling of a great number of small articles when the load is taken off the trailer at the store.

It is the contention of the Roulston company that if gravity chutes were used, small articles, such as cans of spices, 1-pound boxes of rice, bottles of catsup, bluing, vinegar, etc., would have to be put into cartons before they could slide down the chutes, and that the time required to do this, together with that required to assemble and check each order at the base of the chute, would more than offset the time now taken to pack the goods in large barrels or boxes and then take them down on the elevators to the ground floor.

As the goods is taken from stock it is put on the small handtrucks, which are then pulled to points near the elevator on that particular floor. They remain there until the delivery superintendent calls for them, at which time they are taken to the ground floor, rolled to the platform and loaded directly into the empty trailer. By this method the goods are handled twice, once when put on the handtruck and again when taken off. If industrial trucks were used, their cost would make it imperative to have them in motion all the time to enable them to prove as cheap as the present method, and this would necessitate unloading them on the loading platform at the end of each trip. Besides causing congestion at the loading platform, this would also require a third and extra handling of the goods in removing it from the industrial truck to the platform before it was loaded on the trailer. Due to the fact that the goods is stored on but two floors above the ground one, the hauls are very short, and consequently the standing time of the industrial trucks would be comparatively large, thereby not enabling them to make use of their greater ground-covering ability. Electric transfer trucks, used in connection with false bodies, however, would seem well adapted.

All the incoming goods shipped by railroad to the Roulston company reaches the warehouse in express trolley cars operated over the street tracks from the Long Island freight terminals. This method is much cheaper than would be the case if the tractors were used to do the work because of the long delays encountered at the terminals. For this reason, none of the incoming goods is handled by the tractors except boat shipments of tea and green coffee. As shown in the illustration at the top of page 6, the trolley track runs in off the street and along the front edge of the same platform at which the semi-trailers are loaded. The trolley wires to permit the cars to run in along the platform are carried in a trough on the underside of the roof beams over the platform and the maneuvering space in front of it.

### How Empty Trailers Are Supported

This necessitated the use of some means for supporting the front ends of the empty trailers which would not interfere with the overhead trolley wires and which would also enable the trailers to be pulled away from the platform edge to permit the trolleys to enter in case of necessity.

Before deciding upon the best methods to use for the purpose of coupling and uncoupling the trailers and for supporting the front ends when at the loading platform, officials of the Roulston com-

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pany studied the methods in use by the Cranford Co., a contracting concern, and the Borden's Condensed Milk Co., both in Brooklyn, N. Y.

The device in use by the Cranford Co., as described in THE COMMERCIAL VEHICLE of May 1, 1914, consists of a steel bent with differential block-and-falls which can be slid along the top in much the same fashion as a trolley. This method was not suitable for the Roulston company because of its initial cost and because the overhead framing would interfere with the trolley wires.

In the Borden method, as described in THE COMMERCIAL VEHICLE of June 1, 1914, two ordinary jacks are used to raise the front end of the trailer so that the tractor may uncouple. These are left in place until the trailer is moved to the loading platform by the use of a fore-carriage and then put back to support it until the tractor couples on. Two men are necessary to jack up or let down the trailer and the jacks must be carried by hand to the trailer before being put into position, one on each side, near the front.

### One Jack Lifts Trailer

The Roulston method differs from the Borden in that one larger hydraulic jack instead of two smaller ordinary jacks is used to elevate the front end of the trailer. The hydraulic jack is mounted on a small two-wheeled carriage with a long handle, as shown in the sketch on page 7, which makes it very easy to move from trailer to trailer and eliminates any carrying on the part of the operator. This jack is put into position under the center line of the trailer at a point approximating the center of gravity of trailer and load, as shown in the cut at the bottom of page 7.

The jack is not left in position to support the trailer, this being done by means of an angle iron bolted to the front end of the trailer which rests on a movable wood horse. This frees the jack for lifting other trailers. Three hydraulic jacks mounted on carriages and two unmounted ones are used in connection with the nine trailers.

In order to determine first hand the actual working conditions under which the tractors are operated, an observer for THE COMMERCIAL VEHICLE accompanied one of the vehicles on one of its trips to Islip, Sayville and Port Jefferson, L. I. The log of this trip is given on this page and the route on the map, page 8.

The outstanding features of the tractor operation as disclosed by the log of the trip are: The great mileage—145—with an average speed of 10.1 miles per hour throughout the trip, including idle loading and unloading time at the three stores visited; the tonnage of 6.5 hauled; the fact that the coupling operation at the start and the uncoupling at the end of the trip each took but 5 minutes, and the fact that the tractor was actually in motion for 70 per cent of the total trip time. The latter is due, of course, to the elimination of the idle loading time of about 2 hours at the plant, and this in turn is responsible for the high operating efficiency of the vehicle observed and for the others of the Roulston fleet, operated in the same manner.

## Itinerary of Trip With Thomas Roulston's Garford Tractor in Grocery Store Delivery, Oct. 5, 1915

**Start made from plant, Ninth street and Second avenue, Brooklyn, N. Y.**
**Vehicle—Garford 6-ton tractor with semi-trailer.**
**Load at start—Three hundred and sixteen packages consisting of boxes, barrels and crates of miscellaneous groceries and tins of sugar; gross weight, 6 tons.**
**Return load—One hundred empty boxes, barrels, crates and sugar tins; total weight, 1,000 pounds.**
**Class of work—Delivery of miscellaneous groceries to Thomas Roulston stores in Islip, Sayville and Port Jefferson, L. I.**
**Number of trips—One.**

**Route—From plant, east on Ninth street, north on Fourth avenue, to Dean street to Nostrand avenue, to Pacific street to Atlantic avenue to Ashford street to Ridgewood avenue to Rockaway boulevard to Locust avenue to Merrick road through Springfield, Rosedale, Valley Stream, Lynnbrook, Rockville Center, Baldwin, Freeport, Seaford, Amityville, Babylon, Brightwaters, Bayshore to Islip. From Islip to Sayville and thence across Long Island to Port Jefferson. Return trip made over the same route.**

### Detailed Log of Trip

| No. of Operation. | Time, a. m. | Time of Operation. | Hours Elapsed. | Unit Miles | Total Miles | Location of Stop. | Incident. |
|---|---|---|---|---|---|---|---|
| 1 | 6:14 | 0:00 | 0:00 | 0.0 | 0.0 | Loading platform at plant | Arrive; back up to loaded semi-trailer |
| 2 | 6:19 | 0:05 | 0:05 | 0.0 | 0.0 | ..... | Leave; semi-trailer jacked up, wooden horse removed and front end dropped on tractor |
| 3 | 7:13 | 0:54 | 0:59 | 13.0 | 13.0 | On Rockaway boulevard | Stop to fix cylinder pet cock |
| 4 | 7:15 | 0:02 | 1:01 | ... | 13.0 | ..... | Leave |
| 5 | 7:34 | 0:19 | 1:20 | 4.0 | 17.0 | On Merrick road | Started to rain; stop to put down semi-trailer side curtains |
| 6 | 7:43 | 0:09 | 1:29 | ... | 17.0 | ..... | Leave |
| 7 | 8:37 | 0:54 | 2:23 | 14.0 | 31.0 | On Merrick road | Stop to put oil in motor crankcase |
| 8 | 8:45 | 0:08 | 2:31 | ... | 31.0 | ..... | Leave |
| 9 | 9:36 | 0:51 | 3:22 | 14.0 | 45.0 | Store, Islip | Arrive; back up to rear door of store |
| 10 | 9:55 | 0:19 | 3:41 | ... | 45.0 | ..... | Unload sixty-five miscellaneous packages weighing about 1 ton |
| 11 | 10:00 | 0:05 | 3:46 | ... | 45.0 | ..... | Check delivery slip with store manager |
| 12 | 10:12 | 0:12 | 3:58 | ... | 45.0 | ..... | Put water in radiator; leave |
| 13 | 10:47 | 0:35 | 4:33 | 8.0 | 53.0 | Store, Sayville | Arrive |
| 14 | 11:04 | 0:17 | 4:50 | ... | 53.0 | ..... | Unload fifty-five miscellaneous packages weighing about 1 ton |
| 15 | 11:10 | 0:06 | 4:56 | ... | 53.0 | ..... | Check delivery slip with store manager |
| 16 | 11:20 | 0:10 | 5:06 | ... | 53.0 | ..... | Get water from hotel opposite store for radiator; leave |
| | p. m. | | | | | | |
| 17 | 12:54 | 1:34 | 6:40 | 20.0 | 73.0 | Store, Port Jefferson | Arrive |
| 18 | 1:31 | 0:37 | 7:17 | ... | 73.0 | ..... | Unload 196 packages of miscellaneous groceries weighing about 4 tons |
| 19 | 1:41 | 0:10 | 7:27 | ... | 73.0 | ..... | Load fifty empty cases |
| 20 | 1:48 | 0:07 | 7:34 | ... | 73.0 | ..... | Check delivery slip with store manager; leave for lunch |
| 21 | 2:35 | 0:47 | 8:21 | ... | 73.0 | ..... | Finish lunch |
| 22 | 2:42 | 0:07 | 8:28 | ... | 73.0 | ..... | Buy gasoline in garage; leave |
| 23 | 3:17 | 0:35 | 9:03 | 10.0 | 83.0 | On road to Islip | Put oil in crankcase and tape broken magneto coupling. |
| 24 | 3:25 | 0:08 | 9:11 | ... | 83.0 | ..... | Leave |
| 25 | 4:30 | 1:05 | 10:16 | 17.0 | 100.0 | Store, Islip | Arrive |
| 26 | 4:43 | 0:13 | 10:29 | ... | 100.0 | ..... | Load fifty empty cases |
| 27 | 4:48 | 0:05 | 10:34 | ... | 100.0 | ..... | Endeavor to buy new magneto coupling; not successful; leave |
| 28 | 5:00 | 0:12 | 10:46 | 2.0 | 102.0 | Store, Bayshore | Arrive |
| 29 | 5:10 | 0:10 | 10:56 | ... | 102.0 | ..... | Tape magneto coupling; leave |
| 30 | 5:27 | 0:17 | 11:13 | 5.0 | 107.0 | Babylon | Arrive |
| 31 | 5:34 | 0:07 | 11:20 | ... | 107.0 | ..... | Light lights; endeavor to buy magneto coupling; not successful; leave |
| 32 | 6:47 | 1:13 | 12:33 | 18.0 | 125.0 | On Merrick road | Stop to put oil in crankcase and tape magneto coupling |
| 33 | 6:57 | 0:10 | 12:43 | ... | 125.0 | ..... | Leave |
| 34 | 8:32 | 1:35 | 14:18 | 20.0 | 145.0 | Loading platform at plant | Arrive |
| 35 | 8:37 | 0:05 | 14:23 | ... | 145.0 | ..... | Back semi-trailer into position at platform and uncouple same. Finish of trip |

### Resume of Itinerary Statistics

Total time of trip.....14 hours 23 minutes
Total miles traveled.....145
Total tonnage hauled.....6.5
Total number packages delivered.....316
Total commercial ton-miles.....942.5
Total time consumed in making deliveries. 1 hour 36 minutes
Total time consumed in making repairs. 1 hour 28 minutes
Total time consumed in loading.....28 minutes
Average time per package delivered..2.7 minutes
Net running time.....10 hours 4 minutes
Average speed.....10.1 miles per hour
Net average running speed...14.5 miles per hour
Ratio of running time to total time...70 per cent

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## Installation Engineering

AS THE TWIG is bent, so grows the tree. As the truck owner is started, so he continues, and if he is started wrong, it is usually hard knocks if anything that teach him how he should have started. It is the service problem that constitutes the bane of both the buyer and the seller in their relations.

The other night a distinguished aggregation of sales managers, service managers, and a lot of practical, thinking owners with several years of motor truck experience back of them took up the question of service in a serious way. They talked mainly about salesmanship—what a salesman should know, what an owner should know—before the sale.

This was perfectly proper, since service, as the owner sees it at the time of the sale, is largely the way in which he will look upon it after the sale. The owner's conception of service at this time is largely what the salesmen with whom he figures make it.

The greatest service that a seller can give a buyer is that which is given before the latter has paid his money—giving him a clear concept of the manufacturer's responsibilities and those of the owner, as well as a thorough understanding of the truck's limitations when not operated with a reasonable amount of thought and care.

Repair and advisory service after sale is necessary almost in exact proportion to the obscurity of the buyer's understanding of his own responsibilities at the outset.

Men who buy trucks are business men. They pay out their money for motor haulage equipment because they are convinced that they can give better service to their customers and, or, do their haulage or delivery more cheaply with it than with horses or hired service. If proper efforts have been made by the seller to assure himself that the physical characteristics of the installation are such as to warrant this belief and if he has seen to it that the buyer is properly equipped to use the equipment in such manner as will insure that the possibility is rendered a probability, there is every likelihood that the sale will be successful and permanent and that this manufacturer may expect the future business of the purchaser.

Without this invaluable pre-sale service there is grave danger that the owner is buying without the proper conception of what he is doing and that the installation will not be fully successful in all particulars. Particularly is there grounds for apprehension on the score of technical difficulties resulting from mechanical ignorance or lack of proper care.

It is but natural that under these conditions the buyer should feel himself deceived, should fail to realize his own shortcomings and should look to the manufacturer to overcome the difficulties encountered.

Installation engineering contemplates more than the ethics of sale. There is a vast amount of physical investigation necessary in some cases, but all phases of the subject have their bearing upon the appropriateness of the sale and the satisfaction resultant.

## Make the Driver Comfortable

DRIVERS are only human beings, after all. Their job is a hard one. Their remuneration is not great and their opportunities for advancement not dazzling. Much of the mechanical well-being of their mounts depends upon the care with which they are operated. It is human to take pride in a fine thing and to be careful in the use of that which one likes. A horse which is vicious or unruly earns the driver's mistrust and dislike, and it is likely to go hard with the unfortunate beast. Similarly a truck, which by reason of uncomfortable seats, awkward steering wheel angle, difficulty of access, and cramped or hard-acting controls, does not engender the high regard of the driver for it.

One of the most laudable eductions in the 1916 trucks is the improvement of the cab, both in comfort and accessibility. Lower seats, better cushions, greater leg room, greater rake of steering columns, easier-working clutch pedals and side doors are more in evidence.

Passenger car makers long ago learned the importance of catering to the creature comforts of drivers, not alone because passenger car drivers are more often than not owners and future buyers, but because comfort—nay, luxury, begets a cheerful disposition, while inconvenience or discomfort breed discontent and short temper.

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# He Sees the Work Done

CAREFUL and persistent personal supervision coupled with great executive ability and a pleasing personality are the most striking characteristics of James L. Black, the superintendent of motor equipment for C. Feigenspan, Inc., one of the large brewing companies located in Newark, N. J. Black is a firm believer in the old maxim that if you want a thing done right you must do it yourself or give the job your personal supervision while it is being done.

Unfortunately his responsibilities at the head of a large fleet of thirty-four motor trucks will not permit him to give every detail his own personal supervision because of his inability to be in two places at the same time. For this reason, he has had to develop an organization which he has trained to follow out his orders explicitly.

He is responsible for the success or failure of his trucks. His superiors put the blame on him if the truck operation is unsatisfactory. He has a free hand to make it satisfactory. He gives his own orders and as far as possible oversees all the work personally.

The motor equipment of the Feigenspan brewery grew up under the personal supervision of Black, who joined the company in 1909, when it purchased its first three trucks. Before that he had been a passenger car salesman in Newark for 6 years, and before that in other cities since 1900. He learned the proper mechanical operation of motor vehicles while in those capacities.

This was not enough, however, to make him a successful executive, for a comprehensive understanding of the delivery conditions in Newark and the surrounding territory was an all-important essential to the truck efficiency. He was not stumped by this lack of knowledge but energetically set out to secure it. He rode on each of his trucks. He saw first hand the conditions surrounding the actual delivery of the goods. In turn he gave each of his trucks his personal supervision.

As the territory increased due to the use of trucks instead of horses and the routes were rearranged to meet these conditions, Black rode with each truck on its new route. After personally laying out each of the new routes tentatively, Black put a recording device on each of the trucks working on new routes.

These recording devices did not give good satisfaction at first because of their gear drive from the front wheels, which was continually getting out of mesh and out of order because of the vibration of the trucks over rough roads and also possibly because of the drivers' aversion to any sort of checking mechanism. By changing the location of the drive from the wheel to the gearset, the devices gave complete satisfaction.

From the records of these devices, Black learned the truck mileage, the actual running time and the number and duration of the stops. With this knowledge, he was able to tell definitely whether or not the truck was paying on that particular route and also to determine the efficiency of the driver.

Black has found the driver problem one of the most difficult to solve because of the closed shop conditions pertaining to brewery drivers in New Jersey.

He has got around this problem to some extent by the use of a time schedule for each route. From the recording device records and from his own observations while riding on the trucks, he has been able to fix a time limit for each trip and for the total trips per day per truck on any given route or routes. The drivers' working day is 9 hours. If one of them takes 10 hours to cover one or more routes which should be handled in 9 hours according to the time schedule, that driver is paid for but 9 hours' work. If he returns before the 9 hours are up, he is through for the day.

Black arranges the routes so that as few of the trucks as possible return before the 9-hour period is up, or else arranges to have the truck make two or more trips, because he has found it is cheaper to pay overtime to the driver at the rate of 50 cents per hour and have the truck in operation for the full period than it is to eliminate the overtime and have the vehicle in operation for less than the full 9 hours.

(Continued on page 33)

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# Chicago Postal Work Now Motorized

## Philadelphia, Detroit and St. Louis also Get Trucks

CHICAGO, Nov. 17—On Sunday, November 20, the first steps will be taken by the post office toward a complete motorization of Chicago mail handling. The contract under which the street cars have hauled mail from the outlying stations to the central post office ever since the days of the cable, expired last July, and although the service was continued, no new contract was made. Horses, used in other services, are to be retired as quickly as competent mail truck drivers can be secured.

Seventy-six White trucks, of ¾- and 1½-ton capacity, have been ordered by the Post Office Department for Chicago service. These are fitted with the standard screen-wagon body, in the national colors.

The step is one of a series taken in the working out of Postmaster-General Burleson's plan. He has made every effort to induce the greater use of motor trucks in mail service and to eliminate the often unsatisfactory contract method. He did not have the power, under the appropriations granted for the work, to expend money for post office motorization except in an experimental way. Accordingly, a number of cities in the country have been chosen.

Besides Chicago, Detroit, Philadelphia and St. Louis were chosen. Detroit for a number of years has had an extensive motor post office service, and for several weeks has had an exclusive motor service.

The service to which the Chicago Whites will be applied will be first, to displace the unsatisfactory street car service. The street cars in many cases reached neither the local post office direct nor the central post office—never the latter. This required the use of horse wagons at one, and sometimes both, ends. Then, too, the speed of the street cars was not as great as the trucks will make, because of the obstruction of tracks and the slowness of the other cars in congested districts. Any blockade of the tracks always delayed the mail cars, due to their inability to leave the prescribed route and detour around the cause of the blockade.

Another service will be the transfer of mail between the central post office and the railroad depots. Still another will be the pick-up service among the large buildings and commercial houses, and the last, for the time being, at least, will be the delivery of parcel post matter.

Frank H. Gailbraith, superintendent of mails, will be in charge of the fleet, with Fred A. Frees, formerly with Hirsch Hub, the big Chicago clothiers, as head mechanic. The installation is being supervised by James B. Corriden, general superintendent of motor service for the federal postal service.

### ST. LOUIS MAIL MOTORIZED

ST. LOUIS, MO., Nov. 17—The St. Louis mail service was exclusively motorized today when fifty new government-owned motor trucks went into service, replacing horse wagons, leased passenger cars, bicycles and street cars which heretofore had been used in the collection and delivery of mail in St. Louis and its suburbs.

Twenty of the trucks purchased were delivered by the General Motors Truck Co., of this city, at a cost of about $30,000. Fourteen of the G. M. C.'s are of 1,500-pound capacity and six of 1½-ton burden.

### 98 MILES PER CHARGE

NEW YORK CITY, Nov. 20—A new mileage record for the Ward Special 750-pound electric truck has been made and received the official recognition of the New York Electric Vehicle Assn. The truck ran 98 miles on one charge of its Edison battery over the streets of this city, with a capacity load and with a normal frequency of full stops.

The test was observed by John F. Delahant, the association's expert, the same observer who accompanied the Ward Special on its overland trip to Cleveland recently.

The route followed was from Mount Vernon, N. Y., through the Bronx and Manhattan to the Battery, then north to Kingsbridge, back to Fortieth street, and back and forth between Fortieth and One Hundred Sixtieth streets, the Hudson and East rivers, until the battery was discharged. The distance covered was 98 miles, the total time 16 hours, 7 minutes; actual running time, 12 hours, 2½ minutes; average speed, 8.1 miles per hour; number of stops, 35, and the current consumed was equivalent to 164.5 ampere-hours. This figures out 1.68 ampere-hours per mile.

This remarkable record was not made under favorable conditions. A drizzling rain with slippery pavements prevailed throughout most of the test. No repairs or adjustments were made.

### NOVEL NON-SKID DEVICE

FT. WAYNE, IND., Nov. 16—A new company has been organized here to manufacture motor vehicle parts and accessories. One of the most interesting of these is an exhaust-operated non-skid device so arranged that it may be dropped, pressing two shoes against the road, independently of the wheels, in such manner as to raise the latter off the ground, so that it may be used as a jack in changing tires.

### Coming Commercial Vehicle Events

Nov. 29-Dec. 4...Electrical Prosperity Week.

Dec. 14.....Newark, N. J., Monthly Meeting, Motor Truck Club of New Jersey, Automobile Club, 22 Washington place.

Dec. 15.....New York City, Annual Meeting, Motor Truck Club of America, Automobile Club of America.

Dec. 16.....New York City, Met. Sec. S. A. E. Meeting, Automobile Club of America.

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Jan. 5-6.....New York City, S. A. E. Winter Sessions, Standards Committee Meetings.

Jan. 8-15.....Cleveland, O., Show, Wigmore Coliseum.

Jan. 8-15.....Philadelphia, Pa., Show.

Jan. 29-Feb. 5...Columbus, O., Motor Vehicle Show.

Jan. 29-Feb. 5...Minneapolis, Minn., Motor Vehicle Show.

March 4-11.....Boston, Mass., Motor Vehicle Show, Mechanics' Hall.

# Trucks Prominent at Providence Show

## Seventeen Makers Exhibit Thirty two Commercial Vehicles

PROVIDENCE, R. I., Nov. 13—Commercial vehicles occupy a prominent section of the annual motor show under the auspices of the Rhode Island Automobile Dealers Assn., which opened here last night for a week in the state armory. All the various types from the light delivery to the big contractors' trucks, and the various municipal public service machines, are on view, making it a comprehensive exhibit. There are seventeen different makes, exhibiting some thirty-two vehicles.

H. C. Crane is showing Ward electric delivery vehicles. The Aetna Bottle & Stopper Co. has some Buicks, featuring a 45-horsepower delivery model. The Foss-Hughes Co. is exhibiting three Pierce-Arrows, 5- and 2-ton types. The Packard Motor Co. also has three models on view, 1-, 2- and 4-ton types. The Metz company is displaying one of its package delivery types. There is a 1,500-pound Selden exhibited.

The White Co. has one of the largest exhibits. There is a 30-horsepower farm wagon, a charcoal 1½-ton, an ambulance, and a 5-ton truck. The Vim has two models both of the 1,000-pound capacity. There are two Overlands, one a panel delivery and the other an open body. Two types of Federal trucks are shown by the U. S. Mill Supply Co., one being a 2½-ton dump truck and the other a 1½-ton grocery or delivery wagon. The G. M. C. vehicles comprise three models, two stripped chassis and a complete truck.

The Studebaker Corp. is represented by two delivery vehicles, open and closed bodies. The International Harvester has two 20-horsepower models of similar design there. The Jeffery has a stripped chassis and the Republic is seen in an open delivery. The Autocar has an open body and a stripped chassis on view. There are two Reo trucks of 1,500 pounds capacity of the 25-horsepower type. The Hendee Mfg. Co. has several motorcycles with side attachments for quick delivery work.

### TRUCK CLUB TO ELECT

NEW YORK CITY, Nov. 23—The annual meeting of the Motor Truck Club of America, Inc., will be held on December 15, at 8 p. m., at which time the president, three vice presidents, secretary, treasurer and four directors will be elected. It is planned in addition to the business of the evening to have Day Baker, of the General Vehicle Co., present his paper on "Modern Motor Truck Vending."

### DENBY JOINS N. A. C. C.

NEW YORK CITY, Nov. 17—The Denby Motor Truck Co., Detroit, Mich., has been admitted to membership in the National Automobile Chamber of Commerce.

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# New York Police Find Walkers Negligent

## 90 Per Cent of Accidents Due to Pedestrians' Negligence

NEW YORK CITY, Nov. 17—Ninety per cent of the street traffic accidents in New York City are due to carelessness or other fault of the injured, according to a report of the police department, which has adopted a system of reporting such accidents on forms that classify them according to cause, location, nature, seriousness, type of vehicle involved, age of injured, and time of day.

It has been the custom of the public to condemn drivers, particularly of motor vehicles, for recklessness and to demand rigid regulation, but the police reports now show that it is the person afoot that needs to be controlled and to exercise as much caution as is observed by the operators of the vehicles. This will be a revelation to most persons.

Of 1,033 accidents in August in which vehicles were involved and the causes of which were reported, 903, or 90 per cent, were due to the fault of the injured, 51 to the fault of the drivers, 45 to defects in the vehicles, 34 to skidding, and 42 to various other causes.

Of 743 persons struck by vehicles of all kinds, including bicycles, during the month, 679 were killed or injured as a result of their own fault and only 31 due to the fault of the drivers, while 294 persons were struck by vehicles when crossing streets at other than street intersections. Falls from vehicles accounted for 224 accidents, 171 persons were hurt when getting on or off street cars in an improper way, 137 were killed or injured while playing in the street through no fault of drivers, 90 ran into or in front of vehicles, 26 were intoxicated and 58 were stealing rides.

Among other interesting facts shown by the report are that street accidents increase steadily from January to July and then gradually decrease until the end of the year; that most accidents occur from 11 a. m. to 12 noon and from 5 to 7 p. m.; that about 45 per cent of the persons fatally hurt are children and that the largest number of children killed and injured are aged from 2 to 8 years.

### TEST MASS. MOTOR LAW

BOSTON, Nov. 20—The first step in the fight to be waged against the proposal to increase the fees of trucks and cars was taken last week when William A. Thibodeau, general counsel of the Automobile Legal Assn., began a test case to try out the constitutionality of the Massachusetts motor law. While he did it primarily in the interests of the members of his association who are owners of passenger cars, an underlying fact prompted him to go ahead was that many of his members own motor trucks which they use in their business.

The Automobile Legal Assn. has nearly 9,000 members in Massachusetts. Many of them are wealthy business men. So in making the fight Mr. Thibodeau will represent both interests.

The Boston Commercial Vehicle Dealers Assn. has not yet held any meeting to take action upon the matter, but it will come up at the quarterly session to be held in December. Some of the members state that they will vote to have any assistance necessary given to Mr. Thibodeau by their organization and their attorney. As some of these members are also members of the Boston Automobile Dealers Assn., that body will aid in testing out the law. The Bay State A. A. and other associations will also give their assistance.

### TO SOLVE R. R. PROBLEM

BOSTON, MASS., Nov. 22—Recognition of the motor truck as the efficient transportation agency between towns and cities surrounding metropolitan areas, was contained in an argument of Charles S. Pierce, general attorney for the Boston & Maine Railroad Co., before the Terminal Commission sitting at Boston on the subject of improved transportation facilities within the limits of Greater Boston and eastern Massachusetts. Mr. Pierce recognized the handicaps to prompt handling of freight, particularly in less than carload lots, between suburbs like Lynn and Hyde Park, north and south of Boston, respectively, and about 18 miles apart. He said it was doubtful whether any railroad is justified in attempting to retain this local business, which requires rehandling or else two or three switching operations, whereas the motor truck carries such loads with the utmost expeditiousness and without reloading.

### AUTOCAR SALES CONFERENCE

NEW YORK CITY, Nov. 26—Today, a sales conference of the Autocar Co., Ardmore, Pa., opened here. The first session will be a dinner tonight and the business sessions will follow on Saturday. The headquarters of the conference is at the Hotel Martinique, which is convenient both to Broadway and the Autocar branch.

Representatives to the number of ninety are attending the conference. M. S. Bulkley, the Pacific Coast representative, having made the journey from Los Angeles. The conference has been called to map out means and methods of disposing of an increased production of Autocars next season. The business of 1915 is said to have been 70 per cent greater than the year previous, in spite of a lack of war orders, and extensive additions to the Ardmore plant have been made.

### MAKES CREDIT SIMPLER

NEW YORK CITY, Nov. 16—The Acceptance Corp., 55 Liberty street, this city, which has been doing a credit brokerage business since 1909, has recently opened a new department whose activity will be directed toward promoting and assisting credit sales of commercial vehicles.

The method is to buy up notes taken in part payment for trucks at a discount, thereby making it unnecessary for truck dealers to tie up great sums in slow assets. A similar business is done by other concerns, such as the Assets Realization Co., in converting the slow assets of corporations and financing big contracting projects. A number of men prominent in the local motor trade are identified with the concern.

# Autocar Doubles Its Capital Stock

## Peerless and G.V. Merger Will Not Affect Their Policy

PHILADELPHIA, PA., Nov. 20—The Autocar Co., Ardmore, Pa., has increased its capital from $1,000,000 to $2,000,000 to provide for doubling its manufacturing facilities of output of trucks. According to the Autocar company, its sales have increased 70 per cent during the past 10 months over the corresponding period of the year previous. All of the increased business has been domestic, no war orders having been filled. The new stock, which like the original capital, is all common, is being closely held by the original founders of the company and their associates.

### PLANS OF PEERLESS-G. V.

CLEVELAND, Nov. 16—L. H. Kittredge, president the Peerless Motor Car Co., which was recently absorbed by the Peerless Truck & Motor Corp., together with the General Vehicle Co., by the General Electric Co., has issued a statement as follows relative to the portent of the move:

"The majority of the stock of the Peerless Motor Car Co. has been acquired by the Peerless Truck & Motor Corp., which has also acquired control of the General Vehicle Co. and may acquire other concerns engaged in the motor vehicle industry.

"The controlling interests in the Peerless Truck & Motor Corp. are most friendly to the former owners of the majority of the stock of the Peerless Motor Car Co., who will have a large interest in the Peerless Truck & Motor Corp. and who will be represented on its board of directors by Messrs. L. H. Kittredge, B. G. Tremaine and F. S. Terry.

"The Peerless Motor Car Co. will continue exactly as it has been in the past and will maintain its separate corporate existence. It will continue to manufacture its regular line of trucks and a new 2-ton model which will be announced later. Its executive force, sales and factory organizations will be continued without change.

"The plans of the Peerless Truck & Motor Corp. involve the development of the business of the Peerless Motor Car Co. along the broadest and most comprehensive lines, and will, we believe, result in increased opportunities and a more extensive line of product for its dealers."

### NO CHANGE IN G. V. AFFAIRS

NEW YORK CITY, Nov. 22—The recent consolidation of the General Vehicle Co., Long Island City, N. Y., with the Peerless Motor Car Co., Cleveland, O., into the Peerless Truck & Motor Corp., will in no way affect the operating management of the company or its relations with its customers, according to President P. D. Wagoner.

The company will also continue to develop the electric vehicle business and will continue to market and manufacture the Mercedes gasoline truck.

### BIGGER BROCKWAY PLANT

CORTLAND, N. Y., Nov. 18—The Brockway Motor Truck Co., this city, has purchased nearly an acre of land east of its present plant and has begun work on the foundation of a new building 186 feet long and 40 feet wide. The second building will be added in the spring. The buildings are of concrete block.

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### SAXON NOW CORPORATION

DETROIT, MICH., Nov. 20—The Saxon Motor Car Corp. has succeeded the Saxon Motor Co., of this city, maker of the Saxon 400-pound package delivery vehicle. The new concern is incorporated under the laws of New York with a capital stock of $6,000,000.

The Saxon Motor Car Co. was formed in November, 1913, and capitalized at $350,000, of which $250,000 was common stock and $100,000 7 per cent preferred. The entire new stock is common, and half of this, or $3,000,000, will be offered to the public at $75 per share.

### REO TRUCK SURPLUS $250,680

LANSING, MICH., Nov. 20—The balance sheet of the Reo Motor Truck Co. for the fiscal year ending August 31, 1915, shows a surplus of $250,680.74, as compared with a surplus of $91,062 at the end of August, 1914. Cash on hand amounts to $656,616.42 and notes and accounts receivable $191,435.95. The 1915 sheet balances at $1,409,251.09, as against $1,177,741 in 1914.

### CHASE NAMES DIRECTORS

SYRACUSE, N. Y., Nov. 16—Close on the heels of the recent meeting at the Chase Motor Truck Co.'s plant here, comes the announcement of the election of the directors to serve for the next year. They are as follows: A. M. Chase, president and general manager of the company; Col. A. C. Chase; L. O. Buckline, president Little Falls National Bank, Little Falls, N. Y.; E. C. Witherby, general manager, Semet-Solvay Co., Syracuse, N. Y., and H. P. Bellinger, general manager Caustic Dept., Solvay Process Co., Solvay, N. Y.

### POOR LEAVES S. K. F.

NEW YORK CITY, Nov. 16—Frederic H. Poor, who has been general manager for the S. K. F. Ball Bearing Co. of New York since 1909, has resigned that position and has opened an office of his own at 30 Church street. This resignation, however, is merely a formal one, as the new S. K. F. Ball Bearing Co. of Connecticut is planning to absorb the old New York importing company, when it is expected that Mr. Poor will take another contract with the S. K. F. interests. The new company, located in Hartford, Conn., is a manufacturer as well as importer of the S. K. F. self-aligning ball bearings.

Frank A. Vanderlip, president of the National City Bank of New York City, has been elected a director of the new concern.

### SPEEDWELL RECEIVER THROUGH

DAYTON, O., Nov. 18—C. R. Green, receiver for the Speedwell Motor Car Co. in the action of the Dayton Savings & Trust Co. for foreclosure on mortgage bonds, filed his final account and was discharged as receiver. His report shows $19,180.20 received and expended as receiver between August 4 and November 4, 1915.

# Export Regulations Are Revised

## Effective Jan. 1, New Code Will Aid Shippers and Government

WASHINGTON, D. C., Nov. 22—Effective January 1, 1916, new regulations for export have been drafted by the government for the purposes of facilitating complete descriptions in shippers' manifests, keeping valuations secret, facilitating the taking of oaths, and simplification of clerical work in transfer shipments.

The new regulations are a part of Treasury Decision No. 35,708, and in response to an avalanche of inquiries from shippers in all parts of the country, the Bureau of Foreign and Domestic Commerce of the Department of Commerce has published an explanatory pamphlet for free distribution.

Export trade in this country now exceeds $3,000,000,000 annually, and is growing, according to a late report from the Department of Commerce. The new regulations, in brief, are:

1—A simplified form of shippers' export declaration has been prescribed alike for exports by rail and by vessel. It is so drawn up as to prevent the disclosure of the value of the goods to persons outside the customs service. The duplicate to be handed over to the shipper's agent at the seaboard or to the common carrier as proof of compliance with customs requirements will contain no statement of value.

2—The oath to shippers' declarations for export by water may be taken before any person authorized to administer oaths and not as heretofore exclusively before the collector of customs at the port of exportation. This will facilitate the preparation of export declarations by the original shipper instead of by his agent at the seaboard who is less cognizant of the character and value of the merchandise and the country of final destination. Manufacturers themselves are urged to make out the export declarations wherever practicable, to assist in which work the Bureau of Foreign and Domestic Commerce cheerfully supplies to those interested Schedule B containing the official classification of all merchandise entering export trade.

3—The requirement on the part of common carriers have been somewhat simplified and hereafter copies of the way-bills will be accepted from the railroad companies in lieu of car manifests. In vessel manifests a notation that the values are as stated on the shippers' declarations will be accepted in lieu of a detailed statement of the value of each shipment.

4—On and after January 1, 1916, the legal requirement that goods shall not pass out of the jurisdiction of the United States until shippers' declarations are presented in due form will be strictly enforced. Exception will be made only when the carrier gives bond to produce within 15 days export declarations (originals or duplicates) for all shipments.

### BABCOCK TO BUILD UNIT FORD BODIES

WATERTOWN, N. Y., Nov. 24—The H. H. Babcock Co., of this city, is building commercial bodies for Ford cars in thousand lots on the unit plan. There are eight different types for various classes of light delivery work. All are built up from one body base by adding different units. The bodies are delivered painted and complete with all fittings ready to be assembled.

### HENRY FORD & SON

DETROIT, MICH., Nov. 21—Henry Ford & Son is the name of the concern which will manufacture the Ford tractor for farm use. There will be no stockholders and a large amount of the profits of the company will be divided among the workers at the plant in Dearborn, Mich., and the purchasers, it being intended to sell the tractors under a profit-sharing plan.

### PARRY BUILDING TRAILERS

INDIANAPOLIS, IND., Nov. 18—The Parry Mfg. Co., of this city, one of the old-timers in the vehicle field and which has also dabbled somewhat with motor cars, has undertaken the manufacture of motor truck trailers. The latter will be made in both two-wheel and four-wheel types, the latter having simplicity and perfect tracking as features.

In addition to the trailers the Parry company will also produce commercial bodies for Fords and for motor truck chassis.

### FRANCE FACES GAS FAMINE

PARIS, FRANCE, Nov. 5—The scarcity and high price of gasoline in Paris has hit the commercial vehicle owners very hard. The lowest price at which gasoline can be bought retail outside Paris is now 40 cents per gallon, rising in some districts to 50 cents. Taxicab drivers buy their own fuel and are obliged to run their cabs at fares fixed by law. Thus they have to bear the full burden of the increased price.

Probabilities are that the price of gasoline will rise still further. Benzol, which was largely used before the war, is now unprocurable. During the past few weeks it has been difficult to make retail purchases of gasoline. Dealers who handle nothing else have received such small supplies from the refineries that they have preferred to close their establishments. Other dealers refuse to supply any but their regular customers and limit the amount sold at one time to a gallon.

There appears to be no shortage of gasoline for army use, but such quantities are being requisitioned by the military that civilians are faced with a famine. The tremendous activity of French aeroplanes is responsible for a very large increase, and the recent attacks on various parts of the front have put into use thousands of trucks which have been standing idle for several months, with a consequent increase in fuel consumption.

### GASOLINE PRICES HIGHER

NEW YORK CITY, Nov. 23—The wholesale price of gasoline in this city yesterday rose 1 cent per gallon to 19 cents. This results in sending the retail price up to 21 cents per gallon.

In other eastern cities, Boston, Newark, and Buffalo, prices have received 1-cent advances, tank wagon basis. In Chicago, St. Louis, Denver and points in Texas, gasoline yesterday was quoted at 1 to 2 cents higher. In St. Louis it sells at 15 cents. Denver prices are now 18 cents, tank wagon basis.

### SHORT GASOLINE MEASURE

COLUMBUS, O., Nov. 20—Vigorous steps are being taken by Thomas L. Calvert, chief of the dairy and food department of the Ohio Agricultural Commission, to stop the practice of giving short measure in the sale of gasoline. The inspection is in answer to numerous complaints of automobile owners, who claim that many small garages and storekeepers are not giving full measure in their measuring apparatus. The law provides for a fine of $500 and 6 months in jail upon conviction.

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# Ball Bearing Business 1.7 Million a Year

## 15,000,000 Steel Balls Used in U. S. Every Day

Anti-friction bearings, by which are meant ball and roller bearings, are such a hidden component, unit part of a motor vehicle that few realize their importance and the magnitude of the business.

This country uses about 15,000,000 steel balls a day, and somewhere in the neighborhood of 15,000,000 ball and roller bearings a day. While it is true that all of these anti-friction bearings are not used wholly in motor vehicles, they are, however, largely used in bicycles, motorcycles, machinery, machine tools, and a thousand other lines of industrial nedeavor.

When the Underwood Committee was considering the tariff on anti-friction bearings, it was shown that the gross sales thereof amounted to about $15,000,000 annually. Twenty-nine concerns, of which twelve were importers of foreign bearings, were then competing for the business. Roller bearings are practically not imported from abroad but ball bearings are largely imported from Germany, Sweden, Italy, France, Switzerland and England, leading in the order named. Germany, however, being the making and market place of the world for the production and sale of ball bearings.

The war, of course, has shut out all of the foreign business with the exception of those imported from Sweden, hence the production and the sale of American ball bearings has increased tremendously. All makes of bearings nowadays being interchangeable, all of them being made to millimeter sizes, and all of them having in addition to their maker's number, a universal trade number facilitates exchanges and repairs and replacements.—George T. Gwilliam, president the Gwilliam Co., New York City.

Firestone 12-inch solid tire of the steel-base pressed-on type. Note grooves to prevent skidding

# Firestone Giant Tire Repaces Duals

## Big Fellows Avoid Evils of Twins and Ride Easier

Interchangeable with dual tires in all sizes, the Firestone Giant tires, recently brought out after extensive experiment by the Firestone Tire & Rubber Co., Akron, O., are made in 8-, 10- and 12-inch sizes.

The 8-inch tire takes the place of 4-inch duals. The 10-inch, of 5-inch duals and the 12-inch of 6-inch duals. However, it has been found that a 12-inch tire is oversize for a truck normally taking 6-inch duals, and that they may safely be used in lieu of 7-inch duals.

The new tires are of the pressed-on steel-base type, similar to standard sizes up to 7 inches, except that their treads are provided with grooves to break up the sheer width and guard against skidding. These grooves only extend a short distance into the tire body and in no sense make it a multiple tread. In the 12-inch size there are three grooves in the tread. In the smaller sizes there is a less number.

The advantages of these wide tires is that they contain a greater amount of rubber for a given overall width, due to the absence of space between twins, that all the rubber is in one body, which not only increases resiliency but has a number of other advantages.

# U. S. Shares War Triumph

By W. F. Bradley

America got a little share of the glory of the great French victory in the Champagne district, for when it was decided to bring the Kaiser's artillery to the old Invalides courtyard, in Paris, Jeffery Quads were selected for the task. The material came from Chalons to the suburbs of Paris by special trains. At this point it was unloaded and each German gun in condition to be towed was hooked up to the rear of a Jeffery. It was in this way that thirty-nine field pieces of 77-millimeter diameter were taken across Paris, as well as one big 155-millimeter gun, one 105 cannon, and a big electric searchlight. The other captured war material handled by the American trucks comprised sixteen bomb throwers of 105 millimeters, four of 150 millimeters, an 88-millimeter cannon, a 37-millimeter cannon, five 150-millimeter mortars, twenty quick-firing guns, and many wrecked gun carriages. All the captured material was placed in position in the old courtyard, under the shadow of Napoleon's tomb.

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# Water Pails and Seismographs Test Springs

## Machine Feels and Registers Bumps Humans Cannot Detect

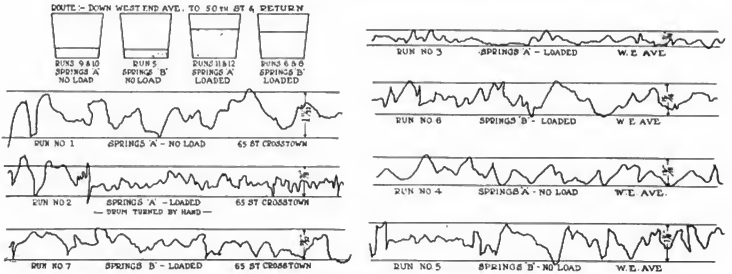


Fig. 1—Records made by Masury vibration machine and by water pail test in testing two grades of springs for Mack trucks

EASE of riding on motor trucks has a very definite and tangible value. Shocks and vibration, if transmitted unduly by the springs to the sprung portions of the chassis result in vexatious and costly repairs, and often serious damage to the goods carried is sustained. The comfort of the driver, too, is not to be wholly disregarded, as a comfortable driver will give better service than one fatigued and sore.

Some springs ride more easily than others. There is so much difference in the riding qualities of some springs that it is easily felt in riding; but in other springs, the difference is not so perceptible. Left to human distinction, two springs might be classed as equally easy riding which in reality had very different characteristics, and their effect upon the chassis might be markedly different in each case.

### Eliminating Guesswork

This has given rise to attempts to substitute a mechanical device of greater sensitiveness than the human body to record the performance of springs under different conditions. With this end in mind, A. F. Masury, chief engineer of the International Motor Co., and A. G. Herreshoff recently conducted some tests of springs in connection with the new AC model Mack experimental truck, to determine which of two makes of springs, both of which gave excellent results as far as the feeling of a passenger could indicate, to choose as standard equipment.

Two tests were made, one with an ordinary water pail filled with water, and the other by a simple form of seismograph. In making the report of the tests, Mr. Masury states as follows:

"Several instruments have previously been made to record the relative motion between the axle and truck body. This would, of course, show the action of the springs, which is an important factor in the riding qualities of a truck. However, the ideal operating conditions would be to have the truck traveling along the road with the truck body moving in an even plane and the axles and springs working up and down under the even-moving body according to the roughness of the road. Our instrument is designed to operate simply by the movement of the body, to determine the best type of spring to use between the body and the axles."

The tests were conducted by equipping the truck with one set of springs and with the testing apparatus in action running it over a number of predetermined routes, after which the springs were changed and the same route covered with the second set.

### Bad Streets Chosen

These tests were seven in number The first was taken on One Hundred Twenty-fifth street, New York, as representing a standard route, the observations extending over a distance of 1 block. This street is paved with an ordinary grade of asphalt and has car tracks to be crossed. Other runs were on Fiftieth street, which is paved with a good grade of granite blocks, and Eleventh avenue, between Fiftieth and Sixty-second streets, on which the pavement is a very rough cobble-stone sur-

### Specifications of Springs Tested

| Detail | Spring A | Spring B |
|---|---|---|
| Front, length | 46 in. | 46 in. |
| width | 3½ in. | 3½ in. |
| thickness | 3 3/16 in. | 3¼ in. |
| No. leaves | 9 | 9 |
| Rear, length | 52 in. | 52 in. |
| width | 4 in. | 4 in. |
| thickness | 3 11/16 in. | 3⅞ in. |
| No. leaves | 10 | 10 |
| *Construction | Graded and guided | |

| Metal | Chrome vanadium | Electric furnace chrome silicon manganese |
|---|---|---|
| Carbon | .47 | .05 |
| Chromium | 1.12 | .77 |
| Manganese | .92 | .83 |
| Silicon | .12 | .41 |
| Vanadium | .20 | .— |
| Phosphorus | .03— | .015 |
| Sulphur | .03— | .015 |
| Elastic limit | 195,000 | 205,000 |
| Tensile strength | 205,000 | 230,000 |
| Elongation | 10.5% | 10.25% |
| Reduction of area | 32% | 41% |

Fig. 2—Close view of Masury vibration recorder, showing paper sheet and spring-mounted pencil. Note simplicity

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Fig. 3—Masury spring testing recorder in application on a Mack 3½-ton truck

face much cut up with railroad and street car tracks.

Where practicable, two drivers were used to duplicate the runs, each driver maintaining the speed at exactly 15 miles per hour for the full length of the test.

The water pail test was the simplest of the two kinds. In this, an ordinary galvanized iron pail, 10½ inches high, was secured to an upright in the body, directly over the middle of the rear axle. At the start of each run this pail was filled with water. As the truck ran over its route the water was allowed to slop out by the movement of the truck body. At the conclusion of the run the amount of water in the pail was measured. The result was that the harder the riding encountered, the less water was left in the pail, which gave an excellent measure of the ease of riding of the vehicle and one which furthermore checked with the one obtained by the seismograph.

### The Masury Instrument

The latter instrument comprised a revolving drum carrying a sheet of paper rolled on a spool beside it. The drum was arranged to be turned by a flexible shaft from the front wheel of the truck or by hand in case of damage to the shaft. The record is inscribed on this sheet by a pencil carried by a spring arm. This spring arm was attached at one end to the frame of the instrument and carried the pencil at the other, the pencil being mounted on a spring swivel, so that it is constantly pressed against the paper. A weight is also carried by the spring, which causes the movement of the arm when the body is jolted.

The drum is of 12 inches diameter, the drive being through spur- and worm-gear reduction and the flexible shaft from the right front wheel. As may be seen in the illustrations, the drum is vertical and was mounted just aft of the cab.

It would seem that the latter instrument might be liable to serious error on account of the flat spring's own periods of vibration conflicting with those of the vehicle springs and producing a record not dead beat. The pressure of the pencil on the paper, however, acts as a very effective dash-pot, so that the instrument is as nearly dead beat as required.

The duplicate results of both types of tests when repeated even with different drivers, proves that the tests are a fair means of comparison.

Fig. 1 shows how the jolting affected the water in the pail, and also the type of record made upon the paper strip by the machine.

## Water Pail Tests

| Run No. | Load lbs. | Spring | In. water left | Per cent. |
|---|---|---|---|---|
| One Hundred Twenty-fifth street route | | | | |
| 2 | 5,000 | A | 6 | 57 |
| 7 | 5,000 | B | 4⅛ | 42 |
| Fiftieth street route | | | | |
| 11 | 5,000 | A | 6⅞ | 66 |
| 12 | 5,000 | A | 6⅞ | 66 |
| 6 | 5,000 | B | 6⅛ | 59 |
| 8 | 5,000 | B | 6⅛ | 60 |
| 9 | 0 | A | 2⅛ | 21 |
| 10 | 0 | A | 2⅜ | 22 |
| 5 | 0 | B | 2⅛ | 20 |

## Masury Vibration Tests

| Run No. | Load lbs. | Spring | Reading inches* |
|---|---|---|---|
| One Hundred Twenty-fifth street route | | | |
| 1 | 0 | A | 1 11/32 |
| 2 | 5,000 | A | 7/8 |
| 7 | 5,000 | B | 29/32 |
| Fiftieth street route | | | |
| 4 | 0 | A | 13/16 |
| 5 | 0 | B | 1 1/8 |
| 3 | 5,000 | A | 7/16 |
| 6 | 5,000 | B | 15/16 |

*Average maximum vibration of pencil.

# Trucks Spells Service

## Chicago Woman Gets Building Material Business With Commercial Vehicle

"I hesitated a long time before deciding to buy a motor truck, but now I wish I had bought it 6 months—yes, a year ago."

It was Miss Astrid S. Rosing, of Chicago, speaking, the only woman who has ever had the courage to engage in the business of selling clay products, according to the Brick and Clay Record.

Thus, in a few short sentences, Miss Rosing summed up her experience with a Kisselkar pump truck.

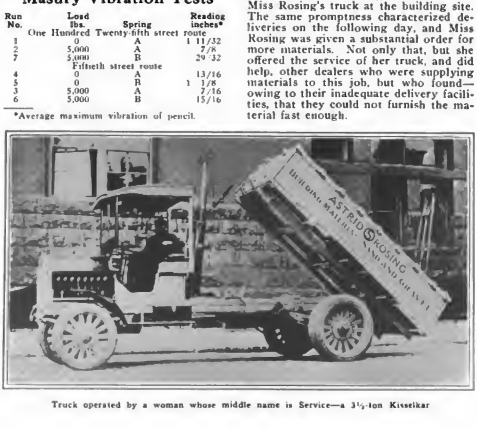
Perhaps the best example of what her truck has done for Miss Rasing may be found in the letting of a contract for the building materials on a job located in one of Chicago's north-short suburbs recently. After spending considerable time in drawing up the plans for the building and letting the contract, the architect suddenly decided that it was a rush job and must be finished in a hurry. Consequently orders were given the contractor to get the building up in record time, and to work nights, if necessary, to expedite the work.

Along toward the close of a busy day—in fact it was about 5:30 p. m.—the telephone bell rang in Miss Rosing's office. The contractor for the north-shore building was on the wire and wanted some material in a hurry. He was planning to work his men that night and they must have some material. The building was a large operation, and although the business offered by the contractor was only for a part of the material, the order was very attractive.

Miss Rosing was asked just how soon the material could be delivered on the ground.

"In a half hour," was the reply.

That was at 5:30. At exactly 6 o'clock, the material was being unloaded from Miss Rosing's truck at the building site. The same promptness characterized deliveries on the following day, and Miss Rosing was given a substantial order for more materials. Not only that, but she offered the service of her truck, and did help, other dealers who were supplying materials to this job, but who found—owing to their inadequate delivery facilities, that they could not furnish the material fast enough.




Truck operated by a woman whose middle name is Service—a 3½-ton Kisselkar

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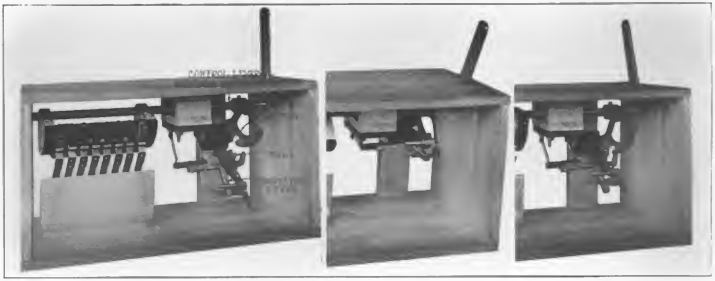

Fig. 1, 2 and 3—Views of Eastman interlocking controller switch

# Making Electrics Safe

**KODAK CONCERN EQUIPS ITS FLEET OF ELECTRIC TRUCKS WITH PAWL-AND-SECTOR DEVICE PREVENTING ACCIDENTAL STARTING**

MECHANICAL ingenuity is a better safeguard against accident than laws. The Eastman Kodak Co., Rochester, N. Y., maintains a Department of Safety & Welfare, of which H. E. Akerly is engineer. By a simple change in the control mechanism of the electric trucks operated by this concern a grave danger in the controller of these vehicles has been eliminated.

Despite the care exercised by trained drivers, the switch on an electric truck is occasionally thrown in while the controller is off the neutral point. This act has caused not only property damage, but frequently personal injuries, and occasionally death.

The fact that this accident hazard existed led the Eastman Kodak Co. to develop a safety device to prevent such an accident. The mechanical engineering department of the Kodak company has just completed the installation of the device on its trucks. With this mechanism it is impossible to close the main switch when the controller is off the neutral point. The device has not been patented, as the designers wished any one caring to do so to take advantage of it, either in building new trucks or in equipping those now in use.

The photographs show one of the devices mounted in a box similar to a driver's seat in the rough. The photographs are taken from the front. The driver sits at the left hand side of the box, operating the control lever, shown in Fig. 1, with his left hand. The rheostat selector shaft, to which the controller lever is attached, also carries a sector which prevents the operator from engaging the switch except when the selector is at the neutral point. A connecting lever has been attached to the main switch from which the handle has been removed. This lever has a pawl. There is a slot in the sector through which the pawl on the lever actuating the switch must pass in order to close the switch. The sector is so located that when the switch is closed the rheostat selectors are all at the neutral point. As the pawl is held forward by a pressure spring, the switch lever can disengage the switch at any position of the selector.

In operation, then, with the controller lever at neutral and the switch disengaged, as in Fig. 1, the switch may be engaged as in Fig. 2, the pawl slipping through the slot in the sector and passing clear through, so that with the switch closed the controller may be moved to the different speeds forward or reverse. If the switch be opened, now, with the controller, say, in one of the reverse notches, it cannot again be closed until the controller lever has been moved to neutral, for the pawl will strike the sector, as in Fig. 3.

## Cuba Found Ripe for Motor Trucks

After a 3-weeks' trip through Cuba, Martin L. Pulcher, vice president and general manager of the Federal Motor Truck Co., has returned to Detroit. Although this was a pleasure trip, his eye could not pass lightly over the big business possibilities of the little island.

"Business is better now than at any time in the history of the island," says Mr. Pulcher. "The reasons are readily apparent—a big sugar crop and high prices, a good healthy tobacco crop, and an enormous increase in exports to South American countries because of inability of European nations to handle their South American trade.

"The motor truck and the motor car have been the biggest factors, I believe, in the development of Cuba. Two years ago passenger cars or motor trucks were a rarety on the island. Mules and oxen were used almost exclusively. But now Havana is full of trucks and motor cars—they are almost as numerous as they are right here in Detroit.

"Motor taxi lines are flourishing and you can go from one end to the other of the big city of Havana for a 20-cent fare. Gasoline sells at 50 cents per gallon for the first quality, and at 35 cents per gallon for second grade. Even at this high price for fuel the commercial vehicle has proven its economy in Cuba, and the use of motor trucks is increasing by leaps and bounds.

"Havana business men are progressive and always alive to better, quicker, more profitable means of doing business. As further proof of the progressive character of business on the island, I saw a cigarette machine costing $5,000 which is capable of manufacturing 300,000 cigarettes a day. The motor truck and car are thoroughly appreciated by such business men as these.

"Further indications of Cuba's progressiveness are seen in her good roads movements. In the city of Havana all the streets are fine, but in the old parts of the town the roads are extremely narrow. The sidewalks are so narrow that people can scarcely pass each other However, in the newer parts of the city the roads and sidewalks are as wide and as good as they are here in the U. S. A.

"The country roads in Cuba are being built into excellent macadam highways. The natural roads are impassable for motors. The macadamized road is being favored rather than concrete roads.

"Touring on the island has become decidedly popular. One road 40 miles out of Havana is the equal in every way to our famous Massachusetts roads."

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# Users and Trade Agree on Rational Service

## Service Symposium of Makers and Operators Conducted At Round Table Meeting of Motor Truck Club of America

"BOTH SIDES of the Service Question" was the general topic discussed by the Motor Truck Club of America in New York City, November 17, speakers from among the owner membership and those from the trade collaborating in pithy and short addresses on the different phases of the motor truck service question.

In many ways the meeting was a novel one. It was held in the dining room of the Automobile Club of America, the table being laid in a huge T and the addresses of the speakers being made over the cigars of the diners.

That both owners and dealers are striving for the same ends in service was apparent. Education of owners was emphasized as the most crying need in the relation between the buyer and seller of motor trucks. Wrong selling methods, due to this lack of information on the buyer's part lead to all manner of missales and false promises. These trade abuses are confined principally to the small buyer, that is, the buyer of one or two trucks, and are very seldom met with in the experience of the fleet operator.

### Service Before the Sale

Roderick Stephens, one of the club's directors and a member of the Olin J. Stephens Coal Co., one of the largest in New York City, spoke on pre-sale service or installation engineering. Mr. Stephens pointed out that the object of service was to make a truck installation successful. He stated that some of the Stephens trucks, of which eight are of one make, are 5 years old. Others are comparatively new. All of these vehicles, Mr. Stephens stated, are good for another 5 years, and he is at a loss to know whether the older one or the newer ones are the best.

Respecting gasoline or electric vehicles, Mr. Stephens stated that in his experience gasoline truck salesmen could learn much from those who sell electric vehicles; that the latter seldom try to sell electric trucks out of their sphere, realizing that their own success must be commensurate with that of the vehicles in service. This is installation engineering.

Mr. Stephens criticised the so-called one-wheel-driven truck severely, stating that the ordinary differential made of every two-wheel-driven truck a one-wheel-driver whenever traction was most needed, as in snow or mud. He doubted if the additional complication involved in four-wheel drive was necessary for traction, but insisted that the rear-wheel-driven trucks be provided with a more positive drive than is usually provided.

Tractor-trailer trains as against independent trucks were briefly touched upon and dismissed by the speaker with the advice that engineering counsel be secured on the subject before either type was purchased.

### Body Selection Important

Other considerations which must be given due weight in selecting commercial vehicle equipment, according to Mr. Stephens, are body types, operating organization and adaptability of the chassis to the work to be done. Concerning bodies, he was of the opinion that this is not a matter to be dismissed lightly. The owner should furnish the maker with his requirements in respect to weight and cubical volume of load to be hauled, the manner in which it is to be loaded and discharged, and then the maker must undertake to work out the concrete appliance with all its accessories, such as dumping bodies, etc.

He considered that it was a mistake for owners to attempt to design their own bodies for chassis of which they had not sufficient knowledge to prescribe and declared that the provision of a proper body was the manufacturer's responsibility, and one on which the ultimate success of the truck largely depends.

Respecting organization, Mr. Stephens stated that this was a matter for the owner himself to work out, and advised that the organizing of the transportation corps he definitely started before the trucks were put into operation. This is a matter of education, he stated, and the owner must see that he thoroughly understands the needs of a motor truck outfit before attempting is operation.

Mr. Stephens advocated a 1-year guaranty of defective material and workmanship, which should be extended to the actual replacement of the damaged part or parts, in the chassis, free of charge. He pointed out that errors in manufacture were not the fault of the owner, and that he should not be held accountable for them. The loss of the truck's service during the interval occupied by the repairs was sufficient penalization for the owner, in the speaker's opinion.

Concerning the owner who knows it all, who has a pre-conceived notion of what he wants in the shape of a truck and then buys on a basis of price and concessions, Mr. Stephens advocated a firm policy on the part of manufacturers. He stated that a truck could not make good unless it was properly adapted to the work and unless the owner fully understood his own responsibility, and that therefore to make a sale with any less understanding was folly. Each, concluded Mr. Stephens, must meet the other half-way, but there must be no half-way business about it.

David C. Fenner, district sales manager for the General Vehicle Co., Long Island City, N. Y., talked on installation service from the standpoint of the maker. Trucks, said Mr. Fenner, must be designed for maximum conditions, not average conditions, if they are to be a success.

Depreciation, he continued, is largely a matter of care. Trucks well taken care of should last much longer than their 5 years of alloted life. He cited the case of the 12-year-old fleet of Knox trucks owned by the Chicago Public Library, every one of which is still in active service, and showing no signs of ever wearing out. Very little of the original machines, stated Mr. Fenner, remains, however, for the vehicles have been constantly renewed as they wore out, so that if the process is continued they may literally last forever.

Mr. Fenner agreed with Mr. Stephens as to the importance of the body, advocating that the chassis be adapted to the body, the latter having been designed for the work to be done, rather than the body being adapted to an arbitrary chassis type.

Salesmen of motor trucks today must conform to three qualifications, according to the speaker, which are:

1—Engineering ability of a practical sort.

2—A first-hand knowledge of transportation.

3—Salesmanship, the greatest need of all.

He ventured the prediction that at some future day engineering ability and transportation experience will be the principal qualifications of a successful truck salesman, even as technical knowledge is today the most important equipment of salesmen in many other fields.

Buyers do too much talking, thinks Mr. Fenner. They should learn to listen. If buyers would listen more and talk less, perhaps, Mr. Fenner believes the popular impression of the truck salesman as a pleasant-mannered but brainless tailor's model would be dispelled.

### Buyers Sometimes Short-sighted

He criticised buyers severely for the practice of pitting one salesman against another, in the effort to secure concessions and the discomfiting of these seekers after their wealth, instead of getting down to brass tacks, informing the salesmen as to their requirements and imbibing the oftentimes excellent advice and information which the latter are only too glad to give buyers.

H. J. Benjamin, of the Auto Truck Storage & Exchange Co., opened the subject of demonstrations from the standpoint of the user. Mr. Benjamin is

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not a user, but a garage operator, but he has had a singular opportunity to observe the experience of users and has a thorough knowledge of their problems.

Misrepresentation at the start, said he, is the cause of 90 per cent of service difficulties, using the terms in their broadest sense. He stated that when he sold locomotives, in his youth, his strongest argument was that the Baldwin company made them. He did not attempt the sale of a locomotive of the switching type where a high-speed passenger engine was wanted, nor a heavy freighter for suburban express service. He offered no service, no guarantee other than the name of the maker. He never found technical service from the maker necessary. The buyers purchased the locomotives because they knew their worth and the responsibility of the house that produced them. They put them to work where they were adapted and maintained them in a manner calculated to produce the best results.

### Service Matter of Persons

From his experience with motor trucks, Mr. Benjamin has concluded that the abuse of service is confined primarily to the relations between the trade and uninformed buyers of small numbers of trucks, and not in the relations between the trade and the operators of big fleets.

The whole service question can best be solved by elimination, the speaker believes, but if service must be given for a while longer, let there be a definite understanding as to just what the buyer may and may not expect from the maker, at the start, before the truck is sold. If the buyer expects nothing definite at the start he is likely to demand anything and everything when he has his first troubles.

J. B. Cowen, of the R. E. Taylor Corp., eastern distributors of Garford trucks, spoke on the same subject.

Demonstrations are the bane of the trade, he asserted. Buyers use demonstrations as an excuse to get truck service in rush periods for nothing. The closest kind of watching will not prevent such impositions on the trade, which would not be so bad were *bona fide* demonstrations of any value when given.

But demonstrations do not show real operating conditions, said the speaker. Operating requirements are so diverse that an equipment of at least a dozen demonstrators with as many men to operate them would be required to give a demonstration of any real value. Often a slight mishap on a demonstration will ruin the sale, although the truck may reveal thereby no real defect.

Successful installations in similar lines of business are the best demonstration, in the opinion of the speaker, and there is more need to educate buyers than salesmen.

### 1-year Warranty, Why Not?

The 1-year guarantee proposed by Mr. Stephens was condemned by Mr. Cowen because it would be abused. He stated that a piano, a typewriter or other device used only under given conditions and always stationary, might be guaranteed in this way, but that with the fate of the truck almost entirely in the hands of one man—the driver—and its well-being dictated to such a great extent by the care which it receives, it would be disastrous for a maker to attempt such a guarantee.

Large buyers demand 30-day demonstrations, under promise to buy if the truck fulfills certain pre-determined requirements. This is Mr. Gowen's idea of a real business demonstration.

George H. Pride, of the Heavy Haulage Co., New York City, vice president of the club and one of its livest members, covered the subject of drivers from the owners viewpoint. He first eliminated the manufacturer from the subject by stating that the question of drivers was one for the owner to solve for himself. When the maker has provided an efficient machine, he has done his duty, and it is then up to the buyer to provide a competent crew or suffer the consequences.

Furthermore, Mr. Pride did not consider it desirable that manufacturers should attempt to supply drivers, as his experience had been that drivers who seek employment from service stations are the least desirable, for a driver who is a good man will not have to hang around the manufacturer's premises to keep employed.

Much difficulty with motor trucks was ascribed by Mr. Pride to expecting too much of the driver. Drivers should no more be expected to make repairs than locomotive engineers are to repair their tenders, than horse drivers are to shoe and doctor their horses. Similarly, mechanics should not be expected to make good drivers.

Mr. Pride's experience in building up a corps of drivers which is the envy of all of his business rivals and friends alike has found it most satisfactory to train in his own men. One of the greatest difficulties which he has experienced has been that other business houses persist in stealing his drivers by offering them bigger pay or shorter hours to work for them. When these drivers fail to do anything wonderful, it is sometimes borne in on the man-thief's understanding that it is not so much the individual driver as it is the manner in which he is trained and the sort of *esprit de corps* that is maintained by the executive in his organization.

### Can't Eliminate Depreciation

In respect to the extended life of trucks, mentioned by Mr. Fenner, Mr. Pride stated that the expense of constant renewals, such as calculated to prevent the truck ever wearing out, rendered the cost of operation just as high as the usual method of charging off 20 per cent depreciation annually. He stated that one has to pay for truck wear whether you call it depreciation at a fixed rate or repairs at a variable rate.

Respecting Mr. Stephens' 1-year guarantee, Mr. Pride stated that most owners do not want such a guarantee, and that for himself he should prefer that the makers, instead of setting aside a certain portion of the purchase price of each vehicle for service and living up to the guarantee, should put the fund into betterment of the trucks, so that the service and guaranteed replacements would not be necessary.

Service stations, thought Mr. Pride, should be kept open during the night hours and Saturday afternoon. He was severe in his criticism of the practice of a great many in keeping open only during business hours. Motor truck owners want to use their vehicles during business hours, he explained, and most of their need for service is outside of them, so that the trucks need not be kept out of service during the working day.

Time-and-a-half charges for work done outside of business hours also came in for Mr. Pride's strenuous condemnation. To charge owners so much more simply defeats the service station's primary object—to see that the trucks are repaired properly—and forces owners to take their work to independent repair shops, or to do their own repairing.

### Human Element 70 Per Cent

Winthrop Waite, of the Packard company, also a vice president of the club, supplemented Mr. Pride's remarks with the assertion that the human element—drivers—was responsible for 70 per cent of truck success or failure. He stated that while he agreed with Mr. Pride that no reputable maker will undertake to provide users with competent drivers, the manufacturer has a responsibility of an educational sort. He sketched the need of drivers' schools conducted by the manufacturer and also the need of co-operative assistance to drivers on the job from well-qualified members of the service station's technical staff.

He pointed out that the employment of cheap help on trucks was the falsest kind of economy. He stated that the driver's life was hard, and that most of them earned every cent they got. He made a plea that owners see that their governors are not tampered with.

The subject was closed by Theodore D. Pratt, president of the club and works engineer of the Central Stamping Co., Newark, N. J., who spoke on inspection, repairs and parts and substitute trucks.

### Free Service Decried by Owner

While not gainsaying the value of inspection, nay its imperative need, Mr. Pratt pointed out that free inspection by the factory rarely succeeds because owners do not value that which they receive without cost. If a competent man in the owner's organization can be detailed to this job, that is the best arrangement. Mr. Pratt thought, but in case no such man exists, one should be selected from the owner's staff and the maker should give him a course of instruction to fit him for the task.

A full stock of repair parts and quick delivery were emphasized as the most important duty of the maker in respect to repairs and parts. Get the needed parts to the owner, and get them there quickly, counselled the speaker, then talk about charges.

Before the truck has been repaired is the worst time of all to talk to the owner about charges, but after speedy and efficient service has been rendered, little trouble in collecting a fair and reasonable bill need be anticipated.

He also pointed out the need of a really complete stock of parts, even including parts which theoretically cannot break, citing a case in his own experience to show that any part may be called for and called for in a hurry.

### Solving the Substitute Question

Manufacturers were not expected by Mr. Pratt to maintain a fleet of trucks for substitute service. He cited the practice of one of the large New York companies as a better alternative. This concern keeps a list of all important truck-renting concerns in the city who use its vehicles. In case of a call from an owner for an extra vehicle, he is simply given a few of these names, and in most cases succeeds in getting his needs attended to promptly.

Forty members attended, more than thirty taking dinner.

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# Examples of Electric Drive Described to S. A. E.

## Gas-Electric Research Committee Submits Progress Report on Three Magnetic Systems

GASOLINE-ELECTRIC systems have been studied for some months past by the Gas-electric Research Committee of the Society of Automobile Engineers. In a progress report made before the Metropolitan Section at its meeting at the Automobile Club of America building in New York City, November 18, the Thomas, the Autolectric and the Owen systems were discussed.

David Beecroft, editor of THE COMMERCIAL VEHICLE and chairman of the committee, gave a brief summary of the activities of the committee. L. G. Nilson, president of the Nilson-Miller Co., gave an analysis of the different types examined and a description of the Thomas system, and W. P. Kennedy, consulting engineer, described the wiring and circuits in the Entz system used in Owen Magnetic cars, under different conditions of operation.

The description of the Thomas system, which is in extensive use in England, was secured on the occasion of the recent visit of Hedley T. Thomson, one of the managing directors of the company, to this city. This drive, which employs two electrical machines with a planetary gearset interconnecting them, is being successfully used in Europe for heavy units. On railway cars having to climb grades of 2½ per cent with maximum load at 10 m. p. h. these systems have proven to be a success.

As the speed of the vehicle increases the speed of the first electrical machine increases while the speed of the second machine decreases until at half speed, the speed of the second machine which has been in a negative direction reaches zero and then after this time increases in positive speed until finally at maximum vehicle speed both electrical machines are running at engine speed. At maximum vehicle speed, since the two electrical machines are running at equal speed with the motor, the whole system can be connected by means of a jaw clutch, giving solid drive throughout.

Another electrical system, known as the Autolectric, has been discovered by the committee in addition to the previous classifications and a new sub-division will have to be made for it.

The distinctive feature about this system is that at starting it is purely an electrical transmission while after a certain vehicle speed has been reached it automatically becomes electro-mechanical. The battery is at all times available for starting the engine or running the vehicle without the engine and it can be charged from the dynamo with the vehicle stationary. The motor also automatically becomes a generator and can be used for braking when the vehicle is coasting, the current produced by the motor being supplied to the battery.

With the Thomas transmission the motor speed is theoretically intended to remain constant. The various units of the transmission vary in their speed in accordance with the speed of the vehicle. Owing to the planetary gearing, the second electrical machine runs at the same speed as the engine, but in the opposite direction, when first starting. At this time the first electrical machine remains still.

## Among the NEW BOOKS

**"Science and Practice of Management,"** by A. Hamilton Church, and published by the Engineering Magazine Co., is one of the most valuable contributions to the science of efficiency and scientific management yet produced. Mr. Church is an eminent writer on factory administration and has contributed a large number of valuable articles to *The Engineering Magazine.*

While devoted principally to factory management, the principles expounded in this work are worthy of the closest study by thoughtful executives in all lines of modern complicated commercial or manufacturing activity. The work is not an introduction to the art, but an advanced study designed for men of mature experience and large responsibility.

"The problem of management," states the author, "broadly regarded, consists in the practical application of two great intellectual processes. Whatever the end aimed at. . . . . The processes involved are those of analysis and synthesis. In proportion as analysis is keen and correct and synthesis is sure and unerring, so will be the resulting efficiency. If our power of synthesis is less than our power of analysis, academic and theoretical systems will result. If on the other hand we neglect analysis and force synthesis without having shrewdly studied our ground, some, and even considerable practical success may result, but there will be a great waste of opportunity and failure to obtain efficient results."

Speaking further of synthesis and analysis, he says: "The main distinction between synthesis and analysis . . . . is that synthesis is concerned with fashioning means to effect large ends and analysis is concerned with the correct local use of given means."

One might go on quoting Mr. Church without end and still find succinct and pointed summations of executive lore of inestimable value to the practical manager but to do justice to the book it is only possible to secure the full value of its contents by a careful perusal of its every page. It is not a work for hurried reading, or for spare-time gleaning. It is a textbook for the earnest and practical student of commercial efficiency.

It contains 535 pages, 5 by 7½ inches, and illustrated with a number of illuminating folding charts in color which reduce the systematic logic of the text to concrete form. It is a book for managers who think.

**"The Modern Gas Tractor"** is the latest volume from the pen of Victor W. Page, M. E., published by the Norman W. Henley Publishing Co., 132 Nassau street, New York City. The work is a fit companion to Mr. Page's previous works on motor vehicle construction, "The Modern Gasoline Automobile," which has been called the best book of its kind, "Questions and Answers," and others.

The machines treated in this book are only farm tractor types, used for agricultural purposes, for logging, mining, road construction, etc., including both wheeled types and the track-laying variety. It is characteristically thorough without being tiresome and the matter is arranged in a logical manner so as to be adapted to reference as well as study.

There are eleven chapters, devoted to the field of the tractor, the conditions of service which dictate design, the principles and practices of tractor construction, gas tractor troubles and care and to varied rules and formulas. It is illustrated with 204 half-tone and line cuts, including several folding plates. It contains descriptions of most of the latest types of these machines, and a valuable treatise on methods of applying tractor power to various types of farm machinery, such as threshers, shredders, blowers, ensilage cutters, saws, etc., and a number of hitches and combinations of plows, harrows, drills, binders, road scrapers, etc. An interesting section is devoted to suggestions for farm shops, machines and tools.

The volume contains 462 pages of text and data, is well and thoroughly indexed and bound in brick-red cloth, 5 by 7½. It sells for $2.00 net.

**Tire Rate Book,** the initial issue of which has recently been published by the Motor World Publishing Co., 239 west Thirty-ninth street, New York City, contains price lists of pneumatic tires and tubes manufactured by forty-six different concerns. The book will be published three times a year. Its purpose is to give the dealer in pneumatic tires one book in which he can find the prices of tires, instead of several loose sheets of each company, as has heretofore been the case. The price of the book is 25 cents per copy or 50 cents per year, for three issues, in advance.

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Turning around on Green Hill with five trailers

# CINCINNATI SOLONS SATISFIED THAT GRADES CANNOT PHASE MOTOR

HILLS have no terrors for modern motor tractors, either in climbing or descending them. Thanks to abundant power, efficient transmission of that power and highly-effective brakes, a Knox tractor has demonstrated its ability to haul great loads of material over ordinary road surfaces, without respect to grades.

The City of Cincinnati, O., recently decided to look into the merits of the gasoline tractor for municipal hauling. Among other things it determined to find out how much tractors could haul, whether several trailers could be handled conveniently, whether the tractor engine was equal to the task of hauling heavy tonnage up an 8 per cent grade and whether the tractor brakes could be depended upon to hold back the combined weight of several heavily loaded trailers down an 8 per cent grade.

### Circumstances of the Test

When preparations for the experiment were completed, a Knox tractor, made by the Knox Motors Co., Springfield, Mass., was brought on the scene. The place chosen for the test was Gilbert Hill, a 7,000-foot stretch with a mean grade of 6.2 per cent; maximum grade 8.3 per cent; minimum, 1.8 per cent. The surface of the street was granite block.

Six trailers were used—ordinary municipal type, dumping wagons, as shown in the illustrations. The city authorities had specified that there should be no load whatever on the rear wheels of the tractor and the demonstration was accordingly made with the entire load rolling on steel wheels. The six trailers were loaded with mud and the total weight of this pay load, as shown by the city scales, was 38,550 pounds, making it an interesting matter for speculation as to whether the big gasoline horse would be able to haul this unusual load, weighing approximately 20 tons, to the summit of the hill.

### A Non-stop Climb

The train was started at the bottom of the hill, made the ascent, turned at the top of the hill without stopping, and with all the wagons tracking perfectly, and returned to the foot of the hill. In coming down the grade the entire load was held back by the tractor only, the brakes on the trailers not being set at any time.

The tractor was brought down the entire length of this 7,000-foot grade in low gear. Two complete stops were made at the steepest part of the hill to demonstrate the ability of the tractor to hold back the load.

The weights of the trailers used in the

Hauling 13 tons up a 6 per cent grade with Knox tractor, one semi-trailer and two Watson wagons

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demonstration, as shown by the city scales, were as follows:

Where 5 wagons were used:

| | |
|---|---|
| First two wagons | 11,600 lbs. |
| Second two wagons | 18,000 lbs. |
| Fifth wagon | 8,950 lbs. |
| Total | 38,550 lbs. |

Where 6 wagons were used:

| | |
|---|---|
| First two wagons | 11,600 lbs. |
| Second two wagons | 18,000 lbs. |
| Third two wagons | 16,070 lbs. |
| Total | 45,670 lbs. |

The weights hauled in this demonstration were 25 per cent in excess of the loads to be hauled by the City of Cincinnati in actual service and the equipment has, therefore, been purchased.

Another interesting instance of the successful working out of the tractor and trailer method is the hauling done by a Knox tractor owned by the City of Springfield, Mass. Two of the illustrations show hot asphalt being hauled from Springfield to Indian Orchard, a distance of 7 miles. As in case of Cincinnati, the trailer was of the regulation municipal bottom-dumping type. The first trailer carried 8 tons and each of the other two contained 2½ tons, making a total pay load of 13 tons. No difficulty was experienced in negotiating Armory street hill—a 6 per cent grade—and the average running time between loading point and destination was said by the driver to be 1 hour.

The illustrations show one obvious advantage of the tractor and trailer for this type of road construction work—the ease with which the load may be dumped and spread in any desired position. Other advantages claimed for the tractor and trailer method are that the bulk of the paying load rolls on steel-shod wheels, that the power plant may be transferred from one type of work to another merely by interchanging trailers, and that the trailer method makes possible the highway transportation of such materials as steel girders, long lumber timbers and other commodities which cannot be hauled successfully by gasoline power in other ways.

Dumping 8 tons of asphalt in a windrow after a 7-mile haul—The asphalt is still hot

## Farm Truck Saves Half Day

Edward Franzmeier, a farmer near St. Paul, Minn., milks twenty head of grade cows every day and hauls the milk to some retail grocers in St. Paul. He also raises squash, lima beans, melons, sweet corn, potatoes and small grain. Last July Mr. Franzmeier bought a 1-ton Kisselkar truck to save time and wear and tear on his teams.

Before he bought his motor truck, Franzmeier got up at midnight and left at 1 a. m., arriving at the St. Paul market at 4 or 4:30 a. m. Now he rises at 4 a. m., starts at 4:15, arriving at the market at 5. He says that when the market is good he is often home again at 7 a. m. ready for a day's work. By the old method he was away from home from midnight until noon and came back with a tired team and himself in no condition to do very much work that day.

Mr. Franzmeier says he would not be without a truck and the one he bought suits him exactly. All of his farm hauling is done with it—such as hauling machinery or taking plows to the blacksmith, so that his horses are reserved for work in the fields.

Tractor proving ability to haul 38,550 pounds in gross load up and down grade. To the left, it is shown descending a 7.8 per cent grade with only the tractor brakes in action

To the right, the same five trailers shown above being drawn up a 8½ per cent grade. The speed which the tractor was making at the time this photograph was taken was 3½ miles per hour

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# Trucks Cheaper Than Horses on 1-mile Hauls

## Provided They Are Kept Moving by Use of Quick-loading Devices

MOTOR trucks can be operated more cheaply than horses on hauls 1 mile in length, provided the former are kept moving by the use of some form of modern time-saving device for quick loading and unloading. Under these conditions the length of haul has no bearing on truck efficiency, notwithstanding the common but erroneous belief that trucks are only cheaper than horses on long-haul work.

While it is true that many truck installations on short-haul work are costing more per unit of work done than horses on the same work, this is not due to the trucks themselves, but to the manner in which they are applied. That many examples of poor loading and unloading conditions may be found today in practically all classes of work is due to three main causes as follows: 1—That many buildings have no provisions for efficient truck loading. 2—That the architects of modern structures seem to have no clear conception of motor truck needs. 3—That many truck owners do not realize that the cost of building changes to give efficient loading facilities will be more than offset by the savings effected by the trucks under the better working conditions.

Motor trucks may be kept moving by various forms of time-saving devices, according to the class of work in which they are engaged. These may be divided into three general classes as follows: 1—Mechanical devices on the truck or at the points of loading and unloading. 2—Demountable or nest bodies or bodies with side doors. 3—By the use of trailers.

These salient points were brought out in the address of Joseph Husson, of the editorial staff of this magazine, in his talk to the salesmen of the R. E. Taylor Corp., New York City, Garford distributor in the east, on November 13. Mr. Husson's paper follows:

# Modern Time-saving Devices Increase Truck Efficiency

By Joseph Husson

MOTOR TRUCKS can be made cheaper than horses on 1-mile hauls. Short hauls have always been the bane of successful truck operation, according to many users, but the greater truck efficiency as compared to horses may be secured irrespective of the length of haul.

Wrong is the belief that motor trucks are only efficient on long hauls. Although you often hear that trucks are not as efficient as horses except on long hauls, this is not the fault of the trucks but of the manner in which they are applied. The length of haul has nothing to do with it. In speaking with motor truck salesmen, you often find them loud in their claims of economy of trucks when the haul is long, but they begin to hedge when you start to talk of 1-mile runs. This is wrong.

One of the many instances where large truck economy has been effected on hauls 1 mile in length by the use of time-saving devices is that of the Curtis Publishing Company, Philadelphia, Pa. One of the remarkable features about this saving is that all of the trucks which made it possible work on runs in the most congested part of the city, none of which are more than 1.1 miles in length! In this case, the trucks, all electrics, haul rolls of paper from the warehouse to the plant at Independence Square, bags of periodicals from the plant to the railroad station and the wharves along the Delaware river and coal from the warehouse to the plant. Electrically-operated hoists put the rolls of paper on the truck at the warehouse and others, also electrically operated, take them off at the plant and deposit them in the basement. The trucks which haul paper continuously from the warehouse to the plant, and run from the plant to the warehouse with bales of waste paper, are in motion for 90 per cent of the time. This remarkable record has been secured only through the use of the modern mechanical means for loading and unloading at each end, the trucks being no different in any respect from others of the same make and size.

### The Efficiency of Demountable Bodies

By co-operation with the Pennsylvania Railroad, the Curtis company now uses demountable bodies for hauling bags of periodicals to the railroad station. These bodies have enabled the Curtis company to handle 28,000 pounds more of outbound mail each week without additional truck equipment, while the railroad has been kept supplied with loads of mail at all times and has increased the efficiency of one portion of its loading and unloading platform 600 per cent.*

Another remarkable instance where the elimination of idle loading time has enabled motor equipment to be used where it was never successfully used before is that of the Municipal Asphalt Plant, New York City. In this case the loading and unloading delays were eliminated by the use of semi-trailers and the small steam rollers which surface the asphalt. Whereas motor trucks have been used quite extensively for hauling asphaltic material used in the construction of new streets where the load was all dumped at one spot, they had never been employed before for patchwork on street maintenance such as the Municipal Plant does, because the patches are generally so scattered and the delays to the trucks so great that their cost has been prohibitive. The cost has been reduced to less than that with horses by the use of gasoline tractors with semi-trailers. They are saving the city $20,000 per year over the cost of doing the haulage with horses. This big saving is due to the elimination of the idle loading and unloading time which enables the tractors to be kept moving.†

### Semi-trailers Solve Grocer's Problem

Another instance where the use of semi-trailers has solved the problem of idle loading time which was suicidal to truck efficiency is that of Thomas Roulston, a Brooklyn, N. Y., grocer, with a chain of 200 retail stores in Brooklyn and Long Island points. He tried trucks and found them a failure because it took 2 hours to load. He eliminated this waste loading time by the use of semi-trailers and tractors, the former being loaded while the tractors are out on other routes, this being possible because there are two trailers to each tractor. He has greatly reduced his delivery costs by this method and has also been able to open stores at a radius of about 60 miles from his warehouse and serve these direct from the plant, which he never could have done with horses.

The Cranford Co., Brooklyn, a large contracting firm now engaged on some of the new subway work, uses tractor-and-semi-trailer units which are loaded with sand and stone by gravity from hoppers, thus reducing the idle loading time. That concern also specializes in asphalt paving work and when thus engaged, makes use of a greater number of trailers than tractors to keep the plant running continuously irrespective of any delay of the tractors in arriving at the plant on schedule time.

The instances quoted above are but a few of the most prominent of a great number of cases where modern time-saving devices have enabled motor truck equipment to effect economies, whereas without them they would have been failures.

The motor truck is a time-saver—when moving. Unfortunately many hundreds of trucks are not moving for as great a proportion of their possible working time as they should, and for this reason do not save as much time as they should and are not as economical as they might be.

Hundreds of thousands of dollars are being wasted annually all over the coun-

*Complete details of the apparatus in use by the Curtis company and its method of operation were published in THE COMMERCIAL VEHICLE of October 1, 1914; October 15, 1914; November 1, 1914, and November 15, 1915.

†A more detailed description of this installation was published in THE COMMERCIAL VEHICLE of June 1, 1915.

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try because motor truck owners have not installed modern time-saving devices in connection with their motor equipment. This condition does not only apply to certain business but unfortunately is general, many instances being found in practically every class of work in which trucks are used. In nine cases out of ten, dissatisfied users of motor trucks can trace the reasons for their dissatisfaction to the methods of loading, whereas those loudest in praise of the motor truck as compared to the horse will be found among those who banished horse-pace methods of loading when they banished the horse. It is impossible to operate motor trucks successfully on horse-pace methods. One of the most flagrant of horse-pace abuses to which motor trucks are subjected is to load them in the same manner as the horse wagons which they replaced were loaded. Whereas an idle loading time of 1 or 2 hours per day did not materially diminish the work done by a horse during the day, and in some cases was necessary in order to give the beast a rest, the same percentage of idle time in the operation of a motor vehicle plays an important part in the latter's cost of operation per unit of work done because of the truck's greater cost of maintenance and its unrealized ground-covering ability.

### Why Poor Loading Conditions Exist

That very poor loading conditions exist today in many instances in practically all businesses in which motor trucks are used is due to three main causes as follows:

1—To the fact that the great majority of buildings were built before motor trucks were considered as delivery vehicles and therefore have no provisions for efficient truck loading.

2—To the fact that the architects of the more modern business buildings seem to have no clear conception of motor truck needs. That this is the case is proven in some of the very latest structures, which, while up to the minute in interior layout, have practically no provision for the efficient handling of goods in or out of the building.

3—To the fact that many of the present-day owners of trucks cannot realize that the cost of providing modern loading and unloading facilities will be paid for in a few years' time at the most, by the savings effected by the trucks themselves. In some cases modern loading and unloading conditions cannot be introduced conveniently, although this is false economy in the end for the reason that a motor truck never made money standing idle. It is then a mere repository for merchandise, and a very expensive one in the bargain.

### Four Classes of Time-saving Devices

Although many instances of very poor loading methods which are suicidal to truck efficiency may be found in practically all lines of business today, these cases are becoming less and less numerous because of the greater dissemination of motor truck operating knowledge and linking up with this, the realization of the fact that time is money and that a motor truck only makes money when it is saving time. This result is being accomplished in many various ways according to the different conditions under which the trucks are working. The means used to accomplish the end desired may be roughly divided into three general classes, as follows:

1—Mechanical loading and unloading devices on the truck or at the points of loading and unloading.

2—The use of demountable or nest bodies or bodies with side doors.

3—The use of trailers of the four-wheeled, semi-trailer or two-wheeled types.

In the first class, the kind of goods being handled has a great deal to do with the type of device used. For instance, in the coal and contracting businesses, loading hoppers with chutes so arranged that the truck can run under them to be loaded, permit the vehicles to be loaded in a fraction of the time it would take were they loaded from the ground by men with shovels. The upkeep of loading hoppers, especially in the coal business, is very expensive, and it is cheaper to store the coal in piles on the ground. Even when this is done, the truck loading time can be reduced to a minimum by the use of portable mechanical loaders of the bucket type which can be moved from pile to pile as desired. Loaders of this type can transfer a ton of coal from the ground to the truck body in 1 minute, whereas by hand shoveling it often takes from 20 to 30 minutes. The use of mechanical means for elevating dumping bodies is becoming universal because of its dependability and quickness as compared to hand elevating.

### Roller Gravity Conveyors Save Time

The use of inclined roller gravity conveyors made in 6- to 10-foot sections which can be moved about easily and made into an irregular line of several units to suit the particular conditions were first used in the brewery trade for loading cases of beer and in the milk business for loading and unloading bottles of milk in boxes. These greatly reduce the time it takes to unload a beer or a box of bottled milk to get from the refrigerator to the tailboard of the truck because the former is generally some distance away, and by carrying each case to the truck over that same the latter is help up out of all proportion to the load put on. Conveyors of this type are fairly simple and cheap and their use in other lines of trade where many packages of nearly uniform size would speed up their loading considerably and therefore enable them to do more work and show a greater profit.

The use of differential block-and-falls operated by hand on overhead trolleys for loading heavy pieces of general merchandise or rolls of paper also saves considerable of the truck loading time as compared to the method of pushing the pieces up inclined skids on rollers by hand or rolling the rolls to the truck platform in the same manner. An improvement over the hand-operated differential hoist is the type driven by self-contained electric motors. These have a greater lifting speed which is constant and does not decrease as the day wears on, as is the case when the men operating the hand hoist get tired along toward the middle of the afternoon.

With or without these types of mechanical devices, the physical characteristics of the buildings in which trucks are loaded or unloaded also play an important part in truck efficiency as mentioned before. In this connection, the trucks should be brought as near to the goods to be loaded as is possible, so as to avoid making the truck wait while the load is being trundled across the floor to the truck tailboard from some distant point. The trucks should also be loaded from a platform level with the floor of the truck body so as to avoid lifting on the part of the loaders, which is extremely tiring and eventually affects the speed of loading.

When the trucks cannot be brought directly to the goods or where the loading time is excessively long because of a great number of small packages to be put on the truck, demountable or nest bodies kept in position on the loading platform or loaded at various points on the floor and transferred to the platform by means of overhead trolley systems, often prove very successful in reducing the loading time.

When demountable or nest bodies cannot be used for lack of space or other physical characteristics of the building or because of the kind of goods hauled, the use of trailers often solves the problem caused by excessive loading time. Whether a truck owner should use a two-wheeled semi-trailer, a four-wheeled trailer or an independent two-wheeled unit, depends to a great extent on the conditions under which the outfit is to work.

Those of you gentlemen who are truck salesmen must realize that in selling a truck you are not merely selling a piece of machinery but a transportation system. If you must oust horses to put trucks in, remember that trucks cannot be operated efficiently on horse-pace methods. They must not be loaded as the horse trucks were for then their ground-covering abilities will not be realized. They will not save as much time as they should, and therefore not as much money.

In modern transportation, time and money are wrapped up so closely that they cannot be separated. In ninety-nine cases out of a hundred, saving of time means a saving of money. A motor truck is a time saver and therefore a money saver—but only when moving.

It is therefore apparent that a successful truck sale is only half completed when the money changes hands from the purchaser to the seller and that if the truck is not kept moving for the greatest possible time each day it is in operation, the sale changes from a successful one into one of dissatisfaction.

### Unsatisfactory Sales Hard to Overcome

One dissatisfactory sale is harder to overcome than to make a dozen successful ones. For this reason, a truck salesman serves his own best interests and those of the company for which he is working by pointing out to a new purchaser that his truck is only a time saver and a money getter as long as it is moving and by showing him how he can keep it moving.

The methods to be pursued in each case in order to keep the truck moving naturally vary a great deal, due to the kind of goods hauled and the peculiar conditions under which each different installation has to work. No matter what these restricting conditions are, they are bound to be one or more places where some sort of mechanical time-saving devices, either on the truck or on the loading platform, may be used to increase the truck's moving time. If these are not applicable, demountable or nest bodies may fill the bill, and if not these, trailers of the four-wheeled or semi-trailer types.

It is up to you salesmen to help solve these problems for the owner, or at least to put the bug in his ear and get him so interested in making more money for himself by making him realize that truck time saved means money saved that he will solve the problem himself.

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# SPECIAL SERVICE

NOTE THE PLEASING APPEARANCE OF THE FRONT VIEW, WITH NONE OF THE SHARP, BOX CORNERS

THEY WERE MOUNTED ON PNEUMATICS ALL AROUND, DUALS BEING USED AT THE REAR

## Motor Buses Keep Railroad Open When Tunnel Burns

COMING to the rescue of the Southern Pacific and the Santa Fe railroads when a tunnel through the mountains near Los Angeles burned last summer eight White buses and two White freight trucks kept the line open for 23 days until the tunnel was repaired. Trains were run up to the tunnel from each side and the motor trucks used to carry passengers, baggage, mail, express and freight both ways between the two points.

This was a most difficult problem, for the vehicles had to cross the Tehachapi mountain range from Tahacapi to Marcel, an 8-mile trip each way over narrow roads with grades in one place as steep as 31 per cent.

On the day the tunnel burned, both railroads were at a loss as to how they could resume their train service. Thompson & Smith, of Bakersfield, Cal., offered to transport all the passengers and freight both ways between the tunnel ends, on contract. At first the railroads were very dubious about giving such a contract because they were afraid that the trucks could not negotiate the steep grades or the poor roads over the Tehachapi range. Finally, however, they consented and the ten White trucks owned by Thompson & Smith began their arduous task.

THIS LITTLE GIANT HAS A DAILY DIET OF HARD PULLS OVER THE MOUNTAIN

How well they did their work may be gauged by the fact that during the 23 days it took to repair the tunnel, 18,000 passengers and 700 tons of mail, express and freight were carried. During the 23-day period none of the trucks missed even one trip. Not one of the 18,000 passengers carried was injured, this being an especially creditable showing considering the dangerous mountain route.

The buses were 1½-ton White chassis with enlarged White touring car bodies, fenders, tops and motor hoods, all so proportioned to produce vehicles of extremely beautiful lines, no matter from what angle they are viewed. Side, front and rear views are shown in the illustration at the top of this page. Note the pleasing appearance of the front view, with none of the sharp, box corners at the front so commonly seen on some of the latter-day types. They were mounted on pneumatics all around, duels being used at the rear. Each bus has five crosswise seats, two being of the cowled-back type used in the latest models of White touring cars.

### Trucks' History Full of Trials

FULL of trials have been the lives of the two 5-ton electric trucks owned by the New York Edison Co., New York City, and used by the transportation department of that concern since 1903. They are practically the same today as they were 12 years ago, except that the number of battery cells has been reduced from forty-eight to forty-four by the use of roller bearings instead of plain bronze ones in the wheel hubs. They are Nos. 701 and 705 of the electric truck fleet of the New York Edison company.

An interesting incident in the history of these trucks

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occurred in 1904, when they hauled the largest block of stone ever shipped into New York City, with the exception of Cleopatra's needle. The stone in question was a huge block for the New York City custom house, quarried and dressed on Hurricane Island, Penobscot Bay, Me. It was valued at $10,000 and took 3 years to cut. Loaded on a lighter, it was towed down the coast to pier No. 4, at the foot of Broad street, New York City, from whence the electrics towed it on a special constructed trailer to the custom house site. Since that time both trucks have been in continuous service of the transportation department of the New York Edison company. Each is equipped with an electric windlass for hoisting and cable-pulling purposes.

More recently they played an important part in the reconstruction of the laboratories of the phonograph plant of Thomas A. Edison, Inc., West Orange, N. J., carrying hundreds of tons of building materials and machinery every day. They were merely loaned to Thomas A. Edison, Inc., in the latter's time of need because of their large carrying capacity.

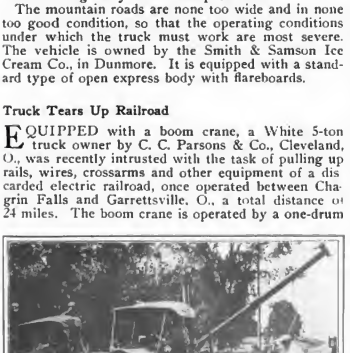
### Ice Cream Truck a Mountain Climber

CARRYING a capacity load of tubs of ice cream, the Little Giant 1-ton truck shown in an accompanying illustration makes three or four trips a day over the steep mountain which forms a part of the Alleghany range between Scranton and Dunmore, Pa. While many trucks are called upon to negotiate very steep grades from time to time, the 1-tonner shown has a daily diet of nothing but hard pulls up one side of the mounain and severe brake tests on the other to keep from running away on the steep declines.

The mountain roads are none too wide and in none too good condition, so that the operating conditions under which the truck must work are most severe. The vehicle is owned by the Smith & Samson Ice Cream Co., in Dunmore. It is equipped with a standard type of open express body with flareboards.

### Truck Tears Up Railroad

EQUIPPED with a boom crane, a White 5-ton truck owner by C. C. Parsons & Co., Cleveland, O., was recently intrusted with the task of pulling up rails, wires, crossarms and other equipment of a discarded electric railroad, once operated between Chagrin Falls and Garrettsville, O., a total distance of 24 miles. The boom crane is operated by a one-drum



A WHITE 5-TON TRUCK * * WAS INTRUSTED WITH THE TASK OF PULLING UP * * * A DISCARDED ELECTRIC RAILROAD

* * THEY HAULED THE LARGEST BLOCK OF STONE EVER SHIPPED TO NEW YORK CITY, WITH THE EXCEPTION OF CLEOPATRA'S NEEDLE

winch mounted on the truck platform and driven by the motor through the gearbox.

In operation, the crane pulls one rail out of the ground at a time. It is then lifted to a point slightly above the truck platform, when the boom is swung around to the other side where a second White 5-tonner is stationed in readiness to receive the load.

A conventional rail tong of the pincer type is used for picking up the rail. A short chain is attached to each handle of the tong. The free ends of the chains are joined by a steel ring on the end of the boom cable. By this means, the tongs merely have to be slipped over the top flange of the rail, for the smallest pull on the lifting cable closes the jaws of the tongs against the rail web. The entire operation of loading, once the rail is loosened, consumes less than 1 minute

The contractors are accomplishing their task at a surprising rate of speed by means of this unique truck equipment, averaging between 160 and 170 rails per day. About half a mile of railroad is torn up daily.

### Fords Make Good on 320-mile Alaskan Haul

DEMONSTRATING that the Ford car is a commercial factor in the transportation of freight and passengers in Alaska, three Fords are now being operated on the 320-mile passenger run between Fairbanks and Chitina. The best time made on this trip is 2½ days and the average 3½ to 6 days, depending upon the weather. The great variance between the shortest and longest route time may be understood best by explaining that when it rains in Alaska, the bottom falls out of what they call roads in that country, and the motor vehicle perforce becomes a submarine.

Not only have the Fords reduced the time formerly required to make the trip by stage coach by from 6 to 8 days, but also the cost. The stage fare on the Ford line is $100 per passenger, or 32 cents per mile. This seems extremely high, when compared to the almost universal rate of from 2 to 5 cents per mile charged by the railroads in other parts of the country. However, it is cheaper than the fare an the same route by horse stage, which is $130 per passenger-trip, or $30 more. Nor is this the only reduction in cost, for the expense en route by the horse stage will average $75 per trip for overnight accommodations at the roadhouses. As the Fords save from 6 to 8 days per trip, the expense at the hotels on the way is naturally less and averages about $25 per trip. The saving in dollars and cents is thus about $80. This, with the great saving in time, proves conclusively the great superiority of the motor vehicle over the horse under extremely difficult conditions.

The Ford line has also been a success financially, for it enables its passengers to save both time and money, thereby getting the trade.

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Philadelphia's conduit-tender on the job

## Tending the City's Nerves

UNDER the streets of Philadelphia are the nerves of the city, the delicate tendrils of copper which give the city eyes at night, which transmit its thoughts and which respond to the irritation of robberies, fires and riots and galvanize the life- and property-saving organs into action—in short, the electric wires used by the various city departments. There are many miles of conduit, carrying electric light mains, telephone and telegraph wires, and the lines of the fire and police alarm systems under Philadelphia's streets, and their care is in charge of the Electrical Bureau.

In the annual report of this bureau, the following passage relative to the Detroit 1,500-pound electric which it operates occurs:

"the time required in repairing troubles on the underground system has been very much reduced by the use of an electric truck, the number of hours in which the underground circuits were out of service having been cut down in 1913 about 40 per cent as compared with 1912.

"the cost of operation in 1913 was a little less than for 1912, even with the greater amount of work. The forces employed were twenty as compared with twenty-one in 1912."

This report was made more than a year ago, and the same still holds good. The truck is used in carrying men and materials necessary to repair jobs over a territory of 129½ square miles. In this area there are 1,800 miles of streets, of which about 1,100 are paved.

Clayton W. Pike, chief of the bureau, gives the following reason for the use of an electric truck in this work:

"The extraordinarily large number of miles of streets which have to be looked after on account of repairing troubles that occur in the vast territory which comes under the supervision of the Electrical Bureau, as well as instances where prompt repairs have to be made at quite a distance from the center of the city, demand that we have a means of locomotion that is much faster than horses and, on account of the advantage gained, we have deemed it to the best interests of the city to use this motor truck."

One instance such as referred to by Mr. Pike was when a defective conductor on the cable entering a fire house 16 miles from the central office paralyzed the fire alarm in that district. The electric reached the scene of the difficulty in an hour and the service was in order in a short time. Another time, a cable was damaged by lightning, 15 miles from the central office, which was reached in about the same time. In each of these cases it would have taken horses from two to three times as long.

The truck carries six men, a driver, an inspector, an electrical plumber and three laborers. It carries the necessary plumber's outfit, with ropes, bars and the necessary tools for the lifting of manhole lids.

## Long Distance Haulage by Electric Truck

SHORT HAULS are recognized as the proper province of the electric truck, but it is not to be assumed from this that battery vehicles are incapable of long-haul work when the exceptional occasion arises that calls for such duty. The New York Edison Co., New York City, recently had occasion to haul an 84-foot smokestack from New York to Tarrytown, N. Y., a distance of 25¾ miles.

Among its extensive fleet of electric trucks of all sizes and types are several old 5-tonners built by the Vehicle Equipment Co., long ago defunct. These vehicles are among the few surviving that are accurately described as power wagons, being built upon the lines of wagons, but provided with low wheels and electric equipment.

The stack was made of steel in seven sections, all of which were carried on the truck together with about a ton of building tackle and a crew of men. The truck not only hauled this load but served as a hoisting engine for the erection of the stack.

The load was 12 feet wide, which occasioned some difficulty in getting through the Yonkers streets, and its height made it necessary to raise trolley wires when these were encountered. Boosts were taken at Yonkers on both the going and coming trips.

Ancient electric on long suburban jaunt

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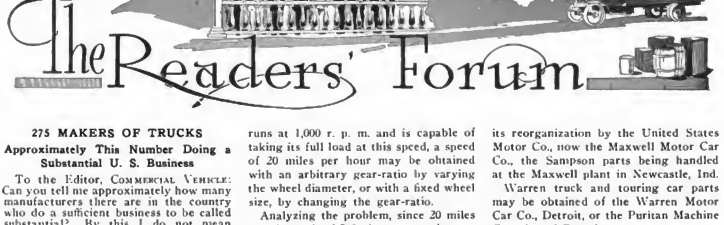


### 275 MAKERS OF TRUCKS

**Approximately This Number Doing a Substantial U. S. Business**

To the Editor, COMMERCIAL VEHICLE: Can you tell me approximately how many manufacturers there are in the country who do a sufficient business to be called substantial? By this I do not mean necessarily large, or internationally important, but I do mean to leave out the little fellows who do a back-alley business or who conduct repair shops where trucks are assembled in the spare moments of the working forces.—Ardent, Ashville, N. C.

The lists of THE COMMERCIAL VEHICLE are now in process of revision for the forthcoming annual forecast and review numbers to appear in January, so that it is not possible to determine the exact number at this time. However, about 275 concerns in the United States are today occupied with motor truck manufacture.

### MUNICIPAL EQUIPMENT WANTED

**Reader Wants Accessories for Vehicles to Be Used By Cities**

To the Editor, COMMERCIAL VEHICLE: The writer is endeavoring to get a list of manufacturers who build municipal equipment. If you have any such list the writer would appreciate a copy of it, if it is in accordance with your policy. —Seller, Toledo, O.

The term "municipal equipment" is rather vague, although it is to be inferred that what is wanted is a list of makers of accessories for motor vehicles to be used in municipal work. This might include fire apparatus, police patrol parts, street cleaning and sprinkling devices and a long list of others. If the reader will signify which class of municipal equipment he is interested in, such a list will be furnished.

### FIGURING GEAR-RATIO

**Reduction Necessary for Given Truck Speed Easily Determined**

To the Editor, COMMERCIAL VEHICLE: Suppose I have a truck in which there is a motor whose normal running speed to produce good power is 1,000 r. p. m. The speed which this truck makes will naturally depend upon various factors—particularly gear reduction. How can I determine what gear-ratio and other things is necessary to produce, say, 20 miles per hour?

The speed which a truck will make, disregarding slip, depends upon three factors, namely, motor speed, gear reduction and size of wheel. If the motor runs at 1,000 r. p. m. and is capable of taking its full load at this speed, a speed of 20 miles per hour may be obtained with an arbitrary gear-ratio by varying the wheel diameter, or with a fixed wheel size, by changing the gear-ratio.

Analyzing the problem, since 20 miles per hour is 1,760 feet per minute—20 x 5.280 = 105,600 ÷ 60 = 1,760—and taking a 3-foot diameter for the wheel, it is seen that such a wheel must revolve 187.5 times per minute to produce 20 miles per hour—3 x 3.1416 = 9.42 and 1,760 ÷ 9.42 = 187.5. Therefore, to move the vehicle 20 miles per hour, the gear will have to be such as to permit the motor to operate at 1,000 r. p. m. while the rear wheels turn 187.5 times, or 1,000 to 187.5. Simplified, this is equal to 5.35 to 1, the gear-ratio sought.

An easy formula for this process is:

$$\frac{R \times D}{88S} = \text{Gear-ratio}$$

when R is the motor r. p. m.
D is the wheel diameter in feet
and S is the speed in m. p. h.

### PARTS FOR OBSOLETE ONES

**Sampson and Warren Trucks and Cars May Be Kept in Repair**

To the Editor, COMMERCIAL VEHICLE: Will you please inform us as to who is handling repair parts for the Samson truck and Warren touring cars?—W. H. Bechtold, manager, Palace Laundry Co., Portland, Ore.

The business of the Alden Sampson Mfg. Co. was taken over shortly before its reorganization by the United States Motor Co., now the Maxwell Motor Car Co., the Sampson parts being handled at the Maxwell plant in Newcastle, Ind.

Warren truck and touring car parts may be obtained of the Warren Motor Car Co., Detroit, or the Puritan Machine Co., also of Detroit.

### A. U. S. MAIL BODY

**Standard Screen Wagon Type for Ford Model T. Chassis**

To the Editor, COMMERCIAL VEHICLE: I am interested in parcel post work and should like to know if there is a standard form of body for a Ford chassis acceptible to the United States Post Office.—Subscriber, Chicago.

Fig. 1 shows a Ford chassis with a screen wagon body, such as specified in the last bids called for by the U. S. Post Office.

### GALLOWAY TRUCK IS DART

**Parts for Vehicle May be Purchased from Iowa Manufacturer**

To the Editor, COMMERCIAL VEHICLE: Can you advise me where I can obtain disks for the clutch in the planetary transmission of a Galloway 1,000-pound truck?—E. H. Pearsall, manager, Corning Automobile Co., Corning, N. Y.

The Galloway truck is the same as the Dart, and is named after the president of the latter concern. The Dart Motor Truck Co., Waterloo, Ia., is the manufacturer, of whom parts for Galloway vehicles may be purchased.

Fig. 1—A Ford chassis with a screen wagon body as specified in the last bids called for by the U. S. Post Office

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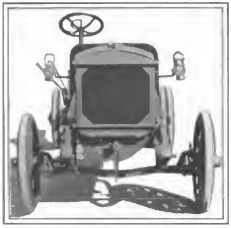

Fig. 1—Head-on view of new 1½-ton Velie truck, showing tubular radiator

INNOVATIONS have been made in the commercial vehicle offering of the Velie Motor Vehicle Co., Moline, Ill. Two new vehicles, of 1½ and 3½ tons capacity, have been produced instead of the five models carried for 1915, which comprised a double-reduction-driven 1-tonner, a worm-driven 1½-tonner, and chain-driven 2½-, 4- and 5-tonners. The new models are not continuations of former products, but entirely new designs to suit modern requirements. The new 3,000-pounder, while of the same capacity and price as the 1915 edition, differs from it in many respects.

## Two New Velie Trucks

For one thing, the motor is smaller, the truck is a trifle faster, the wheelbase is longer, a modern finned-tube, cast-case radiator has been adopted, single ignition, hand-advanced has taken the place of the fixed-spark dual system, a centrifugal governor has replaced the former suction type, and a four-speed gearset has been applied instead of the former three-speed assembly.

The new trucks outline as follows:

| | | |
|---|---|---|
| Capacity | 1½-ton | 3½-ton |
| Price | $2,250 | $3,350 |
| Wheelbase | 150 | 172 |
| Tires, front | 36x4 | 36x5 |
| rear | 36x5 | 36x5d |
| Drive | worm | worm |

Motors are housed beneath neat louvred hoods, and although independent of the gearsets they are suspended directly from the main frames of the chassis. They are of Continental manufacture and embrace the following features:

| | | |
|---|---|---|
| Capacity | 1½-ton | 3½-ton |
| Bore | 4¼ | 4½ |
| Stroke | 5¼ | 5½ |
| S. A. E. h. p. | 27.2 | 32.4 |
| Speed, r. p. m. | 1,000 | 1,100 |
| m. p. h. | 18 | 14 |

Cylinders are cast in block on the smaller motor and in pairs in the larger and three main bearings are found in each. Their valves are at the left, with inclosed mechanisms. Cooling is effected by centrifugal pump circulation through finned-tube Long radiators, in cast aluminum cases, with the tubes vertical.

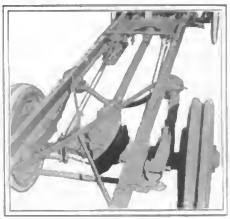

Fig. 2—Rear end of Velie 1½-tonner, showing flexible frame and Hitchkiss drive

Stewart vacuum fuel feed is employed in connection with a Stromberg carburetor on each model and a Pierce governor, driven from the motor limits the motor speed.

Bosch single ignition, hand advanced, is employed.

From the motor, the power is transmitted by the type of dry-plate clutch which has for so long been a feature of Velie products, both in the passenger and commercial fields. This clutch con-

Fig. 3—To the right, side view of Velie 3,000-pound chassis, showing compactness of hood and clean-cut lines

Fig. 4 — The 3½-ton Velie, showing right steer and control and radius rods and torque arm in rear system

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sists of three plates, the central one faced on both sides with Raybestos.

A leather disk universal couples the clutch to the gearbox on each model, the latter depending direct from the frame. Four speeds are provided, affording ratios of from 27.2 to 1 to 6.8 to 1 on the 1½-tonner and from 41.2 to 1 to 10.3 to 1 on the 3½-tonner.

The separated gearset and motor units reduce the free length of shafting sufficient to permit the use of single tubular shafts with two universals between the gearsets and rear axles.

Axles are Timkens, with the characteristic Timken double-internal brakes and the frame of pressed steel is suspended on Perfection springs. The frames on both models are of the flexible type, with integral front spring horns and diagonal strap bracing in the rear.

Hotchkiss drive is used on the smaller model, but on the 3½-tonner radius rods and torque arms are employed.

Right steer and lever position is standard, as these vehicles were built for foreign as well as domestic sale. The steering gears are of Gemmer manufacture.

## Kissel Shaft Drive Extended

EXTENSION of worm drive to one more model has been made by the Kissel Motor Car Co., Hartford, Wis. In the 1915 series of models, there were two bevel-driven types and four with chain drive. For 1916, there is one bevel-driven model, two worm-driven types and but three chain-driven types. The bevel-driven model is the new 1,000 pounder. The former 1,500-pound bevel-driven type has been dropped. The 1-tonner, formerly bevel driven, is now driven by worm gears. The erstwhile 1½-ton chain-driven size is now worm-driven and has a capacity of 2 tons and is worm driven. Then there are the 3-, 4- and 6-ton chain-driven models still remaining. The complete line follows:

| Capacity | Price | Wheel-base | Tires front | Tires rear | Drive |
|---|---|---|---|---|---|
| 1,000 lb. | $950 | 115 | 32x4* | 32x4* | bevel |
| 2,000 lb. | 1,500 | 125 | 35x4½* | 35x4½* | worm |
| 4,000 lb. | 2,100 | 144 | 34x3½ | 36x6 | worm |
| 6,000 lb. | 2,730 | 144 | 36x4 | 38x4d | chain |
| 8,000 lb. | 3,350 | 162 | 36x5 | 40x5d | chain |
| 12,000 lb. | 4,350 | 168 | 36x6 | 40x6d | chain |

*Pneumatic, solid tires optional.

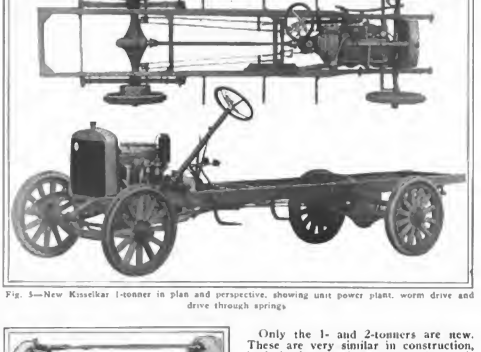

Fig. 5—New Kisselkar 1-tonner in plan and perspective, showing unit power plant, worm drive and drive through springs

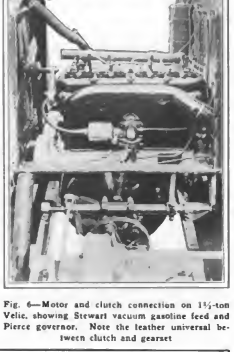

Fig. 6—Motor and clutch connection on 1½-ton Velie, showing Stewart vacuum gasoline feed and Pierce governor. Note the leather universal between clutch and gearset

Fig. 7—Kissel worm-driven 2-tonner, showing characteristic Kissel lines

Only the 1- and 2-tonners are new. These are very similar in construction, both having block motors under their characteristic hoods, that in the 1-tonner being part of a unit power plant, and that in the 2-tonner mounted independently. Both are Kissel-built and are suspended direct from the mainframes. Details follow:

| | | |
|---|---|---|
| Capacity | 2,000 lb. | 4,000 lb. |
| Bore | 3¾ | 4¼ |
| Stroke | 3½ | 5½ |
| S. A. E. h. p. | 24.22 | 29.00 |
| Speed, r. p. m. | 1,420 | 1,295 |
| m. p. h. | 17 | 15 |

The valves on both models are on the right side, their mechanisms inclosed, and crankshafts are mounted on three bearings, in each case. Centrifugal pumps induce water circulation through square-tube sheet-metal-incased radiators of unusual size.

Stromberg carbureters are employed, fed by the Stewart vacuum system from tanks beneath the seats. Governors of Pierce manufacture are used, driven off the motors. Eisemann single ignition with hand spark advanced is used.

From the motor the drive is taken in each case by a cone clutch, the gearset in the smaller model being incorporated with the motor, and that in the larger located separately amidships. Both clutches and gearsets are of Warner manufacture. The gearset on the 1-tonner affords three speeds with reductions from 12 to 1 down to 4 to 1. The 2-tonner uses a four-speed gearbox, however, with direct in third speed, the gear-ratios on this model range from 29¼ to 1 down to 7¾ to 1.

Single shafts transmit the drive on each of these trucks, two universals being used and torque and propulsion being taken on the Hotchkiss principle. The axle of the 1-tonner is of Sheldon make, the larger being a Timken.

General chassis construction is worked out along conventional lines, wheels being of Pruden make, with square spokes, fourteen spokes being found in all wheels but the front ones of the 1-tonner, which have twelve. Left steer and central control are standard on all Kissel trucks. In addition to hand throttle control, Kissel vehicles have foot throttles as well.

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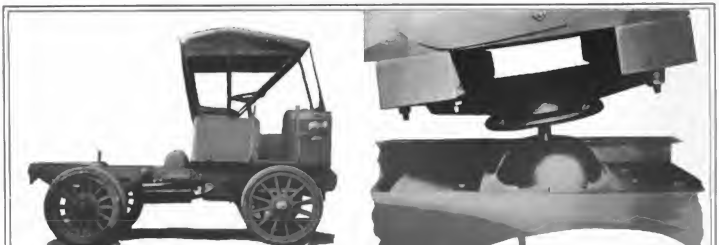

Fig. 8—Transport 5-ton tractor, side view and detail view of trailer connection, showing large dome and cup turning surface

## Four Gary Trucks ¾ to 2 Tons

JUST placed upon the market by a new company, Gary motor trucks, made by the Gary Motor Truck Co., Gary, Ind., are produced in four models of ¾, 1, 1½ and 2 tons capacity, all of practically identical build excepting in size and strength of main parts. They are of standard form throughout, employing unit power plants and worm drive, with European motor location and left steer and control. Their general construction is:

| | | | | |
|---|---|---|---|---|
| Capacity ..... | ¾-ton | 1-ton | 1½-ton | 2-ton |
| Price ..... | ---- | ---- | ---- | ---- |
| Wheelbase ..... | 118 | 128 | 135 | 144* |
| Tires, front..... | 36x3 | 36x3½ | 36x3½ | 36x4 |
| rear ..... | 36x4½ | 36x4 | 36x5 | 36x6 |
| Drive ..... | worm | worm | worm | worm |

*135 optional.

Each model has a different motor, all of Buda manufacture. All motors, however, are incorporated with the clutches and gearsets and mounted directly on the frames. Details of these motors follow:

| | | | | |
|---|---|---|---|---|
| Capacity ..... | ¾-ton | 1-ton | 1½-ton | 2-ton |
| Bore ..... | 3½ | 3¾ | 3¾ | 4¼ |
| Stroke ..... | 5⅛ | 5⅛ | 5½ | 5½ |
| S. A. E. h.p..... | 19.61 | 22.5 | 22.5 | 29 |
| Speed, m. p. h.... | 15 | 15 | 15 | 15 |

All motors are similar, as follows: Their cylinders are cast in pairs, with valves to the right, their mechanisms inclosed beneath aluminum cover-plates. Three bearings support the crankshaft. Cooling is effected by centrifugal pump circulation through sheet-metal-cased cellular radiators, assisted by a fan and louvres in the hood. Eisemann high-tension single ignition with fixed spark is employed and a Stromberg carbureter. All motors are furnished with governors.

Dry-disk clutches, faced with Raybestos, take the drive from the motor to the three-speed selective gearset amidships on each model, from which the drive is taken by single shafts with two universals each to the Sheldon worm-driven rear axles. Springs take both torque and propulsion and left steer and center control are incorporated.

Gary trucks are equipped regularly with Goodyear S. V. solid tires, although pneumatics will be fitted if ordered. Standard bodies are supplied.

## Transport 5-ton Tractor

DESIGNED for the motorization of horse wagons, the Transport tractor, produced by the Transport Tractor Co., Long Island City, N. Y., is a noteworthy example of the development of the tractor-semi-trailer unit. This tractor differs from others in its class in that it is designed for a moderate load, to operate at moderate speeds and that it sells at a moderate price.

A special form of fifth wheel connection is especially noteworthy. This device, although a fifth wheel in purpose and name, has really little in its construction resembling the parent wagon king-bolt platform. Its features are ease of centering, flexibility, and large bearing surface. The features of the tractor are:

| | |
|---|---|
| Capacity ..... | 5 tons net |
| Price, chassis ..... | $2,300 |
| Wheelbase ..... | 80 inches |
| Tires, front ..... | 34 by 4 |
| rear ..... | 34 by 3½ dual |
| Drive ..... | worm |

The power and transmission assembly consists of one compact group, comprising a unit power plant—engine, clutch and gearset—a short shaft and a worm-driven axle. Every moving part is fully inclosed except the driving shaft, even the universals and brakes. The extremely short wheelbase of the vehicle makes possible not only this compact assembly, but a short turning radius as well—25 feet.

The engine has a 3½-inch bore and a 5⅛-inch stroke, and is of Buda manufacture, rating 19.6 horsepower by formula. It is cast in block, has three main bearings and valves to the right with inclosed mechanisms.

Cooling is effected by thermo-syphon circulation through a cellular radiator with a sheet-metal casing. Single ignition with fixed spark is obtained from a Bosch magneto and the carbureter is a Zenith with a horizontal venturi.

A feature of the motor is the Pierce centrifugal governor which, instead of being driven from the motor, is driven off the gearset, at a speed proportional to that of the vehicle at all times. This feature renders the full motor power available in the lower gears and prevents excessive speed on down grades, to a great extent.

The motor and gearset are located between the seats of the tractor, thus providing accessibility and a low cab position together with a short wheelbase.

From the motor the drive is taken by a Brown-Lipe dry-disk clutch and three-speed selective gearset. The driveshaft has two universals and the axle, which is of special design and manufacture,

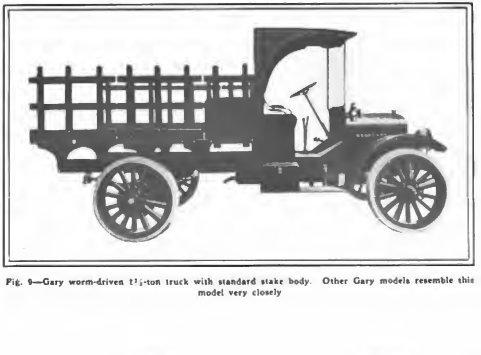

Fig. 9—Gary worm-driven 1½-ton truck with standard stake body. Other Gary models resemble this model very closely

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drives the vehicle through the springs solely.

This axle carries brakes especially adapted to tractor work, there being two sets, both internal, acting on separate drums. These drums are concentric, the smaller being acted upon by the hand-operated expanders and the larger by the foot-actuated shoes. The latter has a 3-inch face and is 18 inches in diameter, while the former has an 11-inch diameter and a 2½-inch face. This arrangement is adopted because the greater leverage secured on the hand lever renders the smaller diameter brake equally as effective as the large foot brake.

The gasoline tank is carried back of the cab, across the frame members, where it is accessible and out of the way. It has a capacity of 12 gallons and is cylindrical.

The driver's position is to the left. Especial attention has been paid to the construction of the cab, which is of steel with high sides and convenient handholds each side of the door. The forward portion of the cab is provided with a large suction box, housing the front end of the motor and the fan, which insures effective air circulation through the entire surface of the radiator. The seats are large, with high backs and good cushions—an advantage whose value to the owner as well as the driver is becoming realized, representing the most potent factor in instilling that love for his mount which inspires the driver to do his best and to refrain from abuse.

The control is simple, the engine being controlled by a foot throttle only.

The Transport trailer connection consists of a large dome bolted to the tractor chassis frame and a corresponding cup attached to the bed of the trailer. The latter is integral with a steel spider, bolted to the under sills of the wagon used as a trailer, in place of the fifth wheel ordinarily used. These cup connections may be purchased separately for application to a number of wagons to be used as trailers for one tractor.

In operation, the lining up of the cup and dome are much more easily accomplished than with the usual type of cylindrical king-bolt and flat fifth wheel. When the jacks are removed from the trailer, the cup centers itself upon the dome, even though the centering may be as much as 3 inches off. When the two members are thus superimposed, the T-shaped king-bolt is dropped through a hole in the cup and a slot in the dome and given a half turn which locks the two members together. The surfaces of the dome and cup are supplied with axle grease for lubrication.

# He Sees the Work Done

(Continued from page 11)

This method of placing a time limit on each route and refusing to pay for time over that limit, has eliminated much of the loafing on the part of the drivers. Black also covers the routes at various times in his own car. This has a good effect on the drivers because they realize that their work is under the personal eye of their boss.

Previous to establishing the time limit schedule for each route, Black tried to devise some bonus system for the drivers based on a ten-mile unit. This proved unsuccessful because of his inability to arrive at any specified unit which would be applicable to both the deliveries of the bottled beer department or of the keg department. City deliveries with stops close together and suburban deliveries with the stops several miles apart, required a separate unit. And even these units were not representative of the amount of work done by the drivers in each class of work because of particularly poor unloading conditions at some places and especially good arrangements at others. Under these circumstances, he found it impracticable to determine or work out any fair basis for the bonus system, and it was therefore abandoned in favor of the time limit schedule which has been responsible for greater truck efficiency.

In his 6 years' experience at the head of the Feigenspan fleet, Black has found that it pays to bring each truck to the shop once each year and practically rebuild it. His gasoline trucks average about 900 miles per month, so that each is brought to the shop after it has covered approximately 10,800 miles. During this overhaul period, the motors are torn apart and repaired as good as new before they are replaced in the truck. Every part of the chassis is carefully examined and repaired or new parts fitted as required. The overhauling takes from 4 to 6 weeks, including the painting of the body. As soon as one truck leaves the shop, another is brought in so that the work does not seriously interfere with the delivery equipment as a whole. This 4- to 6-week period of truck idleness might seem unduly long, but Black has found that it eliminates many of the annoying delays which are sure to occur if the vehicle is allowed to run until something happens to it. Then, if it is not gone over thoroughly, other symptoms appear which require additional short lay-off periods to remedy, and these in the long run consume more time than one good annual overhaul.

The drivers do not make any truck repairs, their function being to drive the trucks, deliver the beer and see that each vehicle is well oiled and greased. Lubrication is one of the most important points to be considered for efficient truck operation. The indolent driver soon finds out that his truck will stand a great deal of abuse and neglects the lubrication system of his truck, due either to indifference, ignorance or lack of time. Black's personal supervision has eliminated the first two causes. He has provided for the third by allowing each of the drivers ½ hour in the morning to do nothing but oil and grease his truck.

Besides personal supervision on the part of the superintendent and an efficient corps of mechanics under him, Black found that a model garage was also necessary for the most economical operation. This has been built and in operation for the past 3 years. It is a three-story structure with an exceptionally large amount of window area, of fireproof construction and equipped with the necessary machinery to carry on all of the repair work on the entire fleet of thirty-four trucks.

While the Feigenspan brewery is not a horseless one, the fleet of trucks makes all the deliveries, the small number of horses still maintained being used for small puttering jobs around the plant.

Black, formerly a native of Wilmington, Del., is now 40 years of age. He is a charter member of the Motor Truck Club of New Jersey and one of its hardest workers in the dissemination of motor truck knowledge in that state.

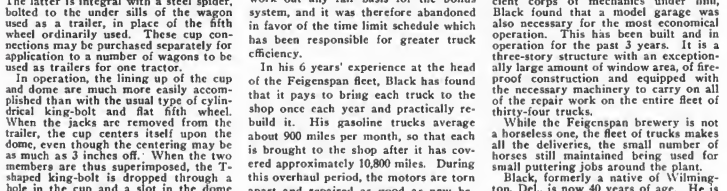

Fig. 10—Power plant and brakes of Transport tractor. Note compactness of transmission from motor to rear wheels, simplicity of drive and absence of torsion or propulsive members on the axle. The Transport brakes are both internal and of exceptional size

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# Men and Makers

**SERVICE MOTOR TRUCK CO.,** Wabash, Ind., is at the present time constructing two new factory buildings which, when completed, will enable the company to more than double its output of trucks. The buildings now in use have a total floor area of approximately 75,000 square feet.

**A. O. Smith Co.,** Milwaukee, Wis., is about to erect a new boiler house to accommodate the increased demand of its power plant. The new building will be 40 by 70 feet and 50 feet high. It will contain three 300-horsepower boilers, together with the latest conveying, stoking and pumping equipment. The structure with its equipment is estimated to cost approximately $35,000.

**Buick Motor Co.,** Flint, Mich., is to double the size of its present plant. A new foundry for motor castings will be erected at once. This will be a two-story building with basement, 470 by 247 feet. An addition to the drop forge plant, 40 by 200 feet, is now under way and further additions will be put up. In all, it is estimated that half a million dollars will be spent in the new work, which will be rushed as rapidly as houses can be put up in Flint for the men to live in.

**Brockway Motor Truck Co.,** Cortland, N. Y., has recently purchased nearly an acre of land adjacent to its present plant. It has already begun work on the foundations of a new building 186 feet long and 40 feet wide. Another building will be erected in the spring. Both structures will be of concrete block.

**Denby Motor Truck Co.,** Detroit, has recently been admitted to membership in the National Automobile Chamber of Commerce, Inc., New York City.

**Willys-Overland Co.,** Toledo, O., has taken over the business of Bowman & Libby, Inc., Minneapolis, Minn., formerly distributers for Willys-Knight passenger cars and Overland delivery vehicles, and is now erecting a large service station and branch office on University avenue, across the river in St. Paul. The new branch organization is termed the Overland Stores Co. The place of W. I. Bowman, the former president of the Bowman & Libby concern, will be taken by Fred N. Coats, a former sales executive of the Willys-Overland company at the head offices in Toledo. He is already on the ground and will divide his time between the new service station in St. Paul and the former plant of the Bowman & Libby organization in Minneapolis. F. W. Libby, the other member of the firm, is to remain with the new concern, together with the rest of the Bowman & Libby organization.

**Studebaker Corp.,** Detroit, is at the present time erecting a new five-story branch in Kansas City, Mo., to cost about $100,000, and to be completed on or about January 1, 1916. It is located on Grand avenue, near the new Union depot, and runs through to Twenty-first street. The entire structure is of reinforced concrete, steel and glass, and is fireproof throughout. The first floor will be occupied by showrooms and offices for both the wholesale and retail departments. The second floor will be used for stock and repair parts. The remaining floors will be devoted to storage and other branch purposes. Other new branches are to be erected in Dallas, Tex., and Portland, Ore.

**Studebaker Service Station in Long Island City, N. Y.,** recently completed, was occupied during the week beginning November 22. It is a concrete building, 80 by 160 feet, and is located on the western side of Anable avenue, south of Meadow street.

**Troy Wagon Wks. Co.,** Troy, O., maker of Troy motor truck trailers, has just appointed two new distributers, one in northeastern Ohio and the other in northern California. The former is G. R. Pennington, who will be located in Cleveland, O., 901 Hippodrome building. The San Francisco distributer is the Edward R. Bacon Co., 51-53 Minna street, San Francisco, Cal.

**Gemmer Mfg. Co.,** Detroit, maker of the Gemmer steering gears, will greatly increase the present production of its plant when additions now being constructed are completed. One addition is a two-story structure, 171 by 60 feet, on the ground floor and 138 by 60 feet on the second floor. An alley between two others of the present buildings has been closed, giving additional floor space 20 feet wide by 350 feet long. The new structures will relieve present congestion in all departments, but more especially in the assembling, service and machine departments. According to Gemmer officials, the orders now on hand will keep the factory busy at full capacity for the next 6 months.

**Auto Wheel Co.,** Lansing, Mich., will soon commence the erection of a brick addition to its plant to take the place of a present wood structure, and which will occupy in addition all of the land now vacant on the west side of the plant. Ten new dry kilns will be installed, bringing the total at the plant up to twenty-seven. At least fifty more workmen will be employed when the new structure is completed. This will make the third addition which the company has put up since March 1 last, all three of which represent a total expenditure of close to $75,000.

**Hydraulic Pressed Steel Co.,** Cleveland, O., is planning the erection of three new additions to its present plant at 3152 east Sixty-first street, to cost approximately $50,000. One of the new buildings will be 360 by 70 feet, and another, 200 by 80 feet, costing about $21,000 and $17,000, respectively. Both of the former buildings will be inclosed in glass. The third structure will be of brick and steel, 60 by 120 feet. All three are to be one-story buildings.

**Hyatt Roller Bearing Co.,** Toledo, O., is rushing the work on the three additions to its plant, which will be ready for occupancy about the first of the year. Two of the additions are 200 feet long, 50 feet wide and eight stories high. Another addition is 110 feet long, 90 feet wide and six stories high. When the structures are completed the plant will have 600,000 square feet of floor space.

**Fafnir Bearing Co.,** New Britain, Conn., has recently opened a Chicago branch office at 39 south Clinton street. D. D. Davis has been placed in charge as manager. The new office will handle all business secured throughout the western territory.

**Simms Magneto Co.,** Bloomfield, N. J., is rushing to completion the two new concrete and brick additions to its plant which are now under construction. One building will be 42 by 70 feet and will

One of the new 4-ton warm-driven Packards recently hauled a 21-ton crankcase milling machine to the site of the new units of the Packard plant in Detroit. This monster piece of machinery was carried on a four-wheeled trailer built especially for the purpose. It was made of extra large truck wheels mounted on special axles carrying a platform constructed of 12-inch channels with an extra-heavy oak flooring. As shown in the illustration above, a winch was provided at the front end of the trailer for hauling the load up on the platform. The truck was also equipped with a winch by means of which the big load was moved slowly through narrow places

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contain the grinding and dipping departments, and the other, 72 by 90 feet, the storage and shipping departments. Both additions were made necessary by the installation of more machinery in the main factory.

**Fickling Enameling Corp.,** Long Island City, N. Y., is at present enlarging its plant by the erection of buildings with about 25,000 square feet of floor area. The new buildings will house the company's assembling plant and separate departments for wood working, metal stamping and upholstering.

**United States Rubber Co.,** New York City, will shortly reopen the plant of the Lycoming Rubber Co., Williamsport, Pa. Minor repairs are now being made to the plant which will be ready for occupation before January 1. It is understood that the company intends to use the Williamsport plant as an overflow factory.

**Directors of the Chase Motor Truck Co.,** Syracuse, N. Y., for 1916 were elected at a recent meeting and are as follows: A. M. Chase, president and general manager of the Chase company; A. C. Chase, Syracuse, N. Y.; E. C. Witherby, manager of the Semet-Solvay Co., Syracuse; L. O. Bucklin, president of the Little Falls National Bank, Little Falls, N. Y., and H. P. Bellinger, manager of the caustic department, Solvay Process Co., Solvay, N. Y. The officers of the Chase company for the coming year will be elected at a meeting to be held at the plant on December 1.

**A. B. Hanson,** formerly manager of the service department of the Chalmers Motor Car Co., Detroit, has recently resigned to become general manager of the Service Motor Truck Co., Wabash, Ind. Mr. Hanson has had a large experience in the various fields of the motor vehicle industry, having been connected with the Pope Motor Car Co., Toledo, O., as assistant sales manager from 1903 to 1909. Later he entered the selling field for himself, representing the Oldsmobile, Oakland and the Detroit electric in Toledo.

**Henry B. Joy,** president of the Packard Motor Car Co., Detroit, was elected a member of the board of governors of the Aero Club of America at a meeting held last week in New York City.

**J. S. Hurd,** formerly connected with the Gramm-Bernstein Co., Lima, O., has recently become a traveling representative for the Four Wheel Drive Auto Co., Clintonville, Wis.

**W. F. Jolley,** formerly with the Troy Wagon Wks. Co., Troy, O., has recently purchased an interest in the Miami Automobile Trailer Co., also in Troy. He has resigned from the Troy Wagon Wks. company and will devote his entire attention henceforth to the business of the Miami company, of which he has become manager. The name of the latter concern will be changed to the Miami Trailer Co., eliminating the word automobile.

**F. A. Cole,** some time ago a member of the organization of the Four Wheel Drive Auto Co., Clintonville, Wis., has again returned to that company and is now acting as a traveling representative.

**H. M. Gordon,** identified with the White Co.'s branch in Boston, Mass., for the past 19 years as purchasing agent, resigned recently to join the Boston branch of the Kelly-Springfield Tire Co., New York City.

**C. S. Huntoon,** of the White Co., Cleveland, O., will hereafter make his headquarters in Portland, Ore., from which he will cover the territory within the states of Oregon, Washington, Idaho, Montana and British Columbia.

**PREPAREDNESS AND WAR**

**Above is depicted a squad of U. S. army engineers hauling two pontoons behind a Jeffery 2-ton four-wheel-driven truck, with the planking for a bridge on the truck. This is preparedness of the right sort. Below a truck of the same make is hauling a 6-inch Krupp gun during the Belgian retreat from Antwerp**

**L. J. Carter,** until recently in charge of retail sales at the Studebaker branch in Saginaw, Mich., has resigned to become sales manager for the Peck Auto Sales Co., exclusive Studebaker dealers in Grand Rapids, Mich.

**H. L. Carpenter** has become associated with Pierce-Arrow interests and the Harrolds Motor Car Co., New York City, and will act as a representative of both the Pierce-Arrow passenger cars and trucks in Brooklyn, N. Y., and Long Island.

**J. N. Alfred** has recently resigned as cashier of the Wilson Foundry & Machine Co., Pontiac, Mich., to become auditor of disbursements for the Timken-Detroit Axle Co., Detroit. For over 2 years previously, Mr. Alfred was in charge of the credit and collection department of the Oakland Motor Car Co.

**W. C. Kenney,** formerly division superintendent of the Northway Motor & Mfg. Co., Detroit, has recently joined the forces of the Hyatt Roller Bearing Co., Toledo, O., as chief mechanical inspector. Previous to his connection with the Northway company, Mr. Kenney was identified with the King Motor Car Co., Detroit; the Pierce-Arrow Motor Car Co., Buffalo, N. Y., and the Locomobile Co. of America, Bridgeport, Conn.

**Perey Holsworth,** formerly with the Yellow Taxicab Co., New York City, has recently become associated with the organization of the Fickling Enameling Corp., Long Island City, N. Y.

**The Board of Directors of the S. K. F. Ball Bearing Co.,** Hartford, Conn., has recently been completed, the following men being members: Frank A. Vanderlip, of the National City Bank, New York City; B. M. W. Hanson, vice president of Pratt & Whitney, Hartford, Conn.; Franklin B. Kirkbride, New York City; A. Carlender and S. Winquist, directors of the Swedish S. K. F. company, which is a large holder in the American corporation, and B. G. Prytz, who will act as president.

**W. C. Morrey,** manager of the timber department of the Hayes Wheel Co., Jackson, Mich., has recently been made vice president of that concern. William C. Snyder and H. D. Hartley, Piqua, O., have become members of the board of directors.

**V. A. Cartmell,** president of the Kelly-Springfield Tire Co., New York City, has recently returned from a business trip along the Pacific coast where he reports that business is very promising.

**B. G. Work,** president of the B. F. Goodrich Co., Akron, O., sailed for Europe on the *Philadelphia* of the American Line on November 22. The trip is made in the interests of the French subsidiary of the Goodrich company.

**L. T. Petersen,** first vice president of the Republic Rubber Co., Youngstown, O., has reeently been placed in charge of the factory operation. He is assisted by J. M. Cranz, general manager, with W. D. Morris acting as manager of the pneumatic and solid tire departments.

**J. H. Kelly,** vice president and general sales manager of the Republic Rubber Co., Youngstown, O., has just returned from a 2-months business trip to Europe. He visited England, France and Italy and reports a large demand for American products, if of the best quality.

**Harry R. Curtiss,** for several years the manager and treasurer of the Boston, Mass., branch of the Splitdorf Electrical Co., Newark, N. J., has resigned to accept the position of manager and treasurer of the Excelsior General Supplies Co., Chicago.

**Charles M. White, Jr.,** formerly manager of the Detroit office of the Stromberg Motor Devices Co., Chicago, has accepted a position in the spring department of the Detroit Steel Products Co., Detroit. Before his connection with the Stromberg company, Mr. White was

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All the mail hauled in or out of the Detroit postoffice is handled exclusively by motor vehicles, except that carried by the regular mailmen delivering from the main office and the various sub-stations. The latest addition to the truck fleet are the seven 1½-ton worm-driven Packards shown above, which were delivered during the first week of November. All are equipped with the standard screen-sided mail bodies designed to haul bulk mail, although they have interior seats which can be folded down and utilized for transporting letter carriers when desired

identified with the organization of the Firestone Tire & Rubber Co., Akron, O.

**Robert M. Ellis,** for the past 2 years manager of the export department of the Splitdorf Electrical Co., Newark, N. J., and who made his headquarters in New York City, has gone to Boston, Mass., to assume charge of the company's branch there.

**E. G. Norris** has recently been made manager of the northwestern branch of the McQuay-Norris Mfg. Co., St. Louis, Mo. He will make his headquarters in Seattle, Wash., and will have charge of the territory comprised by the states of Washington, Oregon, Idaho, Montana and British Columbia.

**V. L. Cramer,** for the past 3 years president of the American Distributing Co., has just been appointed district sales manager for the F. S. Carr Co., Boston, Mass., with headquarters at the Detroit branch, 969 Woodward avenue. The Carr company manufactures Neverleek top material for motor vehicles.

**Heavy Haulage Co.,** New York City, has recently moved its office from 155 east Thirty-fourth street to 47 west Thirty-fourth street. The Heavy Haulage company contracts for special hauling work, which is done by a large fleet of motor trucks.

**Bosch Contracts** for magnetos to be supplied during the 1916 season have just been closed by the Bosch Magneto Co., New York City, with the following manufacturers of motor trucks: Harwood-Barley Mfg. Co., Marion, Ind.; Krebs Commercial Car Co., Clyde, O.; D. F. Poyer Co., Menominee, Mich., and the Service Motor Truck Co., Wabash, Ind.

**Motor Truck Catalogs For Venezuela,** South America, should be sent by mail instead of by parcel post, for in the latter case they are subject to duty, whereas they are admitted free when sent as mail. When a firm in Venezuela is called upon to pay from 40 to 50 cents duty on the catalog of some American maker, sent by parcel post, the usual result is that the catalog is refused and the maker in the United States wonders why he gets no inquiries about his product from that country.

**How to Arrange An Electric Vehicle Parade** is described in a sixteen-page booklet just issued by the Society for Electrical Development, Inc., New York City, for the purpose of holding parades of this nature in all parts of the country during Electrical Prosperity Week, November 29 to December 4. It points out that electric trucks are especially suitable to form the base of an illuminated float and that extra batteries can be fitted for illuminating purposes or for operating a searchlight. A four-page loose insert in the book contains an article entitled, "How to Build an Electric Float," and gives illustrations and working drawings for the construction of a flatiron float mounted on an electric motor truck.

**A Mack Truck Rendered First Aid** at the recent cave-in of the wood street decking of the New York City subway construction which gave way at Seventh avenue and Twenty-fifth street on September 22, for no sooner had the dust settled than a big Mack 5-tonner, locomotive cranes and derricks were removing the debris, the truck carting the material away from the open cut. Before dark on the first day, the Mack had carried away load after load of heavy timbers, pipes and steelwork. The truck worked all night and the day following without interruption, at which time the cut was cleared of all material which had fallen into the excavation.

**The Goodyear Brazilian Jungle Window Display,** shown at all the branches of the Goodyear Tire & Rubber Co., Akron, O., throughout the United States, has created such an unusual amount of interest that it will be reinstalled for an additional period of 2 weeks. The window background represens a section of a Brazilian jungle, with tropical trees and vines and a native in the act of tapping a tree. Various samples of different kinds of rubber are shown in the foreground. Although Brazil still produces a large amount of rubber, the world's source of supply has shifted to the Far East, where plantations have been established and modern methods introduced. It is said that in many cities, school teachers took their pupils to visit the display, merely as an interesting and instructive object lesson in geography.

**There Is a Big Motor Vehicle Market in Peru,** South America, according to N. Pancorvo, Studebaker representative in that country, who has just been visiting the plants of the Studebaker Corp. in Detroit. Mr. Pancorvo states that the large shipments of sugar to Europe are creating a balance of trade in favor of Peru and that business conditions are accordingly becoming better and will continue to improve. Lima, with a population of close to 500,000, already has a fair quota of motor vehicles, both passenger cars and trucks, but these are used almost exclusively within the city limits because of the poor conditions of the roads in the country. In this connection, Mr. Pancorvo has submitted a proposition to the Peruvian Government to act as its representative in this country for the purchase of the necessary road-building equipment in the United States and to furnish same to his government at cost in order to start a movement for the building of permanent improved roadways in Peru. He further believes that the United States can retain and largely increase the trade it is at present drawing from all of the Latin-American countries, provided the right kind of effort is put forth.

**"Motor Trucks of America,"** published annually by the B. F. Goodrich Co., Akron, O., and containing short descriptions and illustrations of nearly 100 makes of American motor trucks, will be published as usual next year, the press date of the 1916 edition being some time in January. Next year's edition will be a larger book in number of pages than even the 1915 issue, but will follow the trend of previous volumes. There will also be several short articles designed to be of interest to both prospective truck buyers and owners of motor truck equipment. The 1915 volume was exhausted soon after publication so that those who are desirous of securing a copy of the 1916 edition may find it a convenience to write to the Goodrich company to have their names placed on the mailing list for the booklet, thus insuring them a copy. It is distributed gratis.

**Cuba's Imports of Motor Trucks** in the fiscal year of 1915 numbered twenty-one, valued at $34,607, as compared with nineteen, valued at $33,500, in 1914. Parts and accessories for both passenger cars and trucks to the value of $101,429 were imported during 1915, as compared to $48,217 worth during the fiscal year of 1914.

**10,179 People Are Employed At the Packard Plant,** in Detroit, according to a recent count made by the Packard Motor Car Co. Of this number about 500 have been added to the payroll since November 1. This increase has been made possible because the Packard company has received a great deal of material which, while ordered several months ago, has been delayed due to the war and various other causes. According to Traffic Manager Charles Shaar, 477 carloads of material and 3,273,560 pounds of additional goods in l. c. l. shipments were received during the month of October alone. The Packard payroll for the past October was $773,879. For November it is expected that the figure will be close to $800,000.

**New Sterling Catalog,** describing and picturing the 1,500-pound, 2- and 3½-ton worm-driven trucks manufactured by the Sterling Motor Truck Co., Milwaukee, Wis., is a well-arranged twenty-eight-page book with many illustrations of Sterling trucks in actual service besides the technical information which it contains. Detailed specifications of each of the Sterling worm-driven models is given. The last six pages are devoted to line drawings of the various types of bodies which may be fitted and four drawings of special wheelbase models with detailed dimensions.

**Pierce-Arrow's Unique Store,** located in the basement of the Pierce-Arrow Motor Car Co.'s building in Buffalo, N. Y., and run by the Pierce-Arrow Employes' Benevolent Assn., is noted for the great variety of articles which can be bought there. A person may buy anything from a pair of shoestrings or a can of beans to 5 tons of coal or an insurance policy for health, accident or life. The gross business of the store is about $70,000 a year and the net profits $1,000 a month.

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# WHITE TRUCKS

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Was conferred upon White Trucks by the Superior Jury of Award, as officially announced by the Secretary of the Jury under date of August Second.

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### REGARDING OTHER CLAIMS

The decision of the Superior Jury is final in the matter of Exposition awards. Hence any announcements of other motor truck manufacturers, claiming to have received the Grand Prize and Highest Award for motor trucks at the Panama-Pacific International Exposition, are automatically denied by this decision of the Superior Jury of Award.

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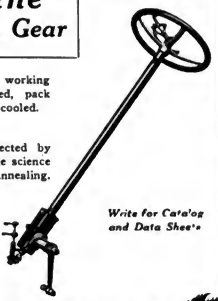

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Our Deliveries of Guaranteed Forgings will be found equally as advantageous as the accuracy of our workmanship, which always has distinguished our products. The development of the heavy duty vehicle and the present activity in this industry leaves small excuse to sacrifice either to the doubtful gain of buying forgings on price alone.

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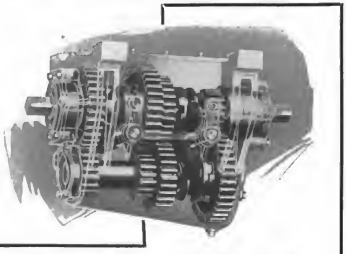
With your co-operation, we are able to supply you with just the truck that will give the most satisfactory and profitable results in your business—Chain or Worm drive models.

**Model "H" 1½ Ton Chain Drive. Model "L" 1 Ton Worm Drive**
**Model "M" 1½ Ton Worm Drive. Model "P" 2 Ton Chain Drive**

**The Bowling Green Motor Truck Co., Bowling Green, Ohio**



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The COTTA Transmission is equipped with devices that protect the mechanism and facilitate operation for the driver.
It is the transmission of maximum safety.
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—have won the confidence of their owners throughout the world by 5 years of matchless performance, service and durability.

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The Agency Is a Valuable Asset

Capacity
2 Ton
2½ Ton
3 Ton
4 Ton

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## "Always on the Job"—Because All the Parts Are STANDARDIZED and Made by STANDARD MAKERS for a Standard Truck

which includes a standard motor—CONTINENTAL; standard axles—TIMKEN; standard worm drive—DAVID-BROWN; standard steering gear—GEMMER; standard bearings throughout—TIMKEN; everything standard, including the name and price, combined to give you that much sought "standardization"—with accessible interchangeable units which already bear the stamp of public approval.

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### With Gravity Pitch Built In

Introducing our newest patent coal body with combined side and rear delivery. As pictured, body has gravity pitch built in. Elevates by hand 2½ feet. Load can be delivered in 4 minutes. Truck shown is 3½-ton Hurlburt. This is the most efficient and practical device we have ever built—the last word in coal body construction.

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***The new REO 1500-pound "hurry up" wagon***

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is in a class by itself when it comes to mechanical perfection, ease of operation, and freedom from that ever troublesome repair bill.

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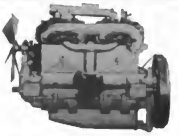

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BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

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MODEL MOTORS

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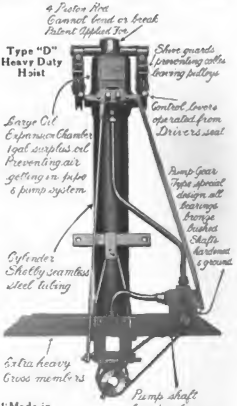
SOLVES THE DUMPING PROBLEM FOR MOTOR DUMP TRUCKS

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our new complete line of fore and aft steering gears.

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Built in the largest and newest steering gear factory in the United States.

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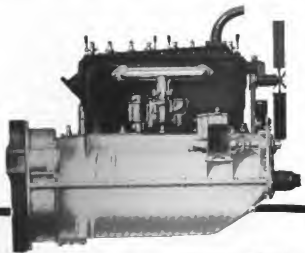

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Type TU
4 in. bore, 6 in. stroke.

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Cylinders interchangeable.

Note these features.

CYLINDERS—Cast en bloc.
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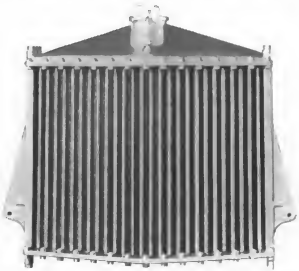

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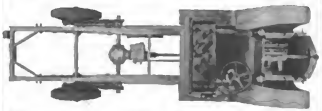

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**Are used by America's leading Truck Builders**

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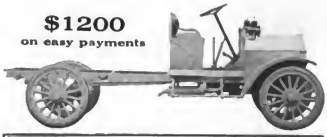

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**Model S ¾ to 1-Ton**

An absolutely reliable truck at a moderate cost. Small up-keep and excellent service under all conditions.

35 H. P. Rutenber motor, worm drive, insures the speed required for rapid and economical deliveries. Its sturdy yet flexible chassis gives it the strength to provide against overloads and any possible careless handling.

A wonderful vehicle for both user and dealer.

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They are designed and built by men who have spent their lives in the study of motor trucks.

They are backed by one of the strongest organizations in the industry.

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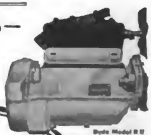
Suppose we assure you—as we *do*—that in accessibility and convenience, power and economy, design and durability, the Buda motor is unexcelled for your purpose at any price. That means your next order for us, surely—*unless you have a doubt.*



Buda Model R U Exhaust Side
3⅛ x 5⅛ in.

"The part that sells the truck"

BUDA MOTOR

THE BUDA COMPANY
Factory, Harvey, Ill. (Chicago Suburb).
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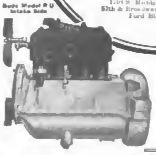
Buda Model R U Intake Side



We mean what we say, exactly at face value. If you think some other motor is better than a Buda or a better *buy* than a Buda, you owe it to yourself to make us prove up.

Don't guess—
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**Trucking by Electric power is not only the cleanest and easiest method but the least expensive. Facts and Figures will be quoted that corroborate this statement or better advise us you want a demonstration.**

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**Manufacturers of Baker and Rauch & Lang pleasure cars and Baker trucks.**

## Make Customers Watch Their Brake Lining

When your truck owner takes brake lining for granted on a heavy truck, he is gambling with death and destruction.

Bad brakes on a truck show criminal negligence.

**Thermoid**
**HYDRAULIC COMPRESSED**
**Brake Lining - 100%**

It costs a truck maker a difference of about the cost of one gallon of gasoline to use Thermoid instead of ordinary brake lining. He knows that Thermoid is better than any brake lining he can buy. If he is willing to cheapen his truck in so vital a part as a brake just to save an amount equal to the cost of a gallon of gasoline, where else has he cheapened it?

Thermoid is brake lining clear through—it holds though worn paper thin—100% brake lining.

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are now used by

## 108 Manufacturers

—the largest in the country—including

**72 Trucks**
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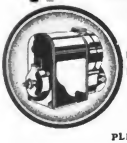
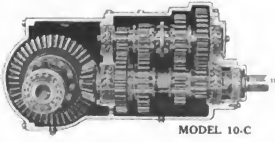


# Insurance Against Carelessness

95% of all commercial vehicles are operated by hired drivers. Many are careless in shifting gears—and costly damage often results.



MODEL 10-C

A Cotta "Short Series" Transmission is insurance against the carelessness of hired chauffeurs. Its construction is rugged. Speed changes are accomplished by heavy "dog clutches" that insure easy and safe engagement.

*Make it Standard Equipment on Your Truck*

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**Cotta "Short Series" Transmission**




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**10,000 to 12,000 miles—**

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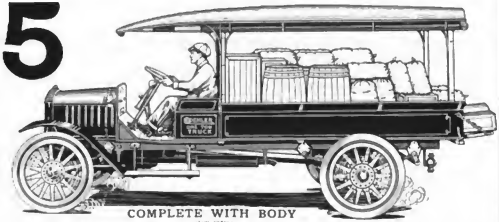
# KOEHLER ONE TON TRUCK

# $895




COMPLETE WITH BODY
(top extra)

**WHEELBASE**—129 INCHES.
**MOTOR**—4 cylinders, **OVERHEAD VALVES.** 35 H.P., large 3-bearing crankshaft.
**TRANSMISSION**—Three speed selective sliding gear. Annular ball bearing.
**BODY**—Extra large, being 8 ft. 6 in. back of driver's seat.
**INTERNAL GEAR REAR AXLE.**
**SPRINGS**—Of graded construction. Front 38 in., Rear 46 in. All bolts have Grease Cups.
**IGNITION**—High tension magneto. **RADIATOR**—built up type with finned top. **BRAKES.** both service and emergency, double acting on rear wheels. **WHEELS**—14 sq. spokes front and rear.
**FLEXIBILITY**—As low as 2 m.p.h. with ton load on high gear. **SPEED**—30 m.p.h. with ton load.

*Agency Correspondence Solicited*

WE do not hesitate to compare the KOEHLER ONE TON TRUCK with any other one ton truck manufactured, irrespective of list price, for economical operation, power under all conditions, efficiency, flexibility, advanced ideas of design, and general appearance.

WE respectfully request that you compare the specifications, appearance and price of the KOEHLER ONE TON TRUCK with those of all other ONE TON trucks.

**H. J. KOEHLER S. G. CO.**
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DUPLEX 4-Wheel Drive Truck loaded to capacity and hauling 6 trailers loaded with a flock of 700 sheep (a total of over 20 tons). This haul was made up and down hills without the slightest difficulty.

While it is seldom that such a test as the above is ever given to any truck, nevertheless, it is the proud boast of the DUPLEX-POWER CAR COMPANY that their

# DUPLEX 4 WHEEL DRIVE

accomplished it with no difficulty. The even, economical manner in which the power is applied to all 4 wheels of this truck accounts for its great efficiency. The United States Government is using them in the Army Signal Corps Division and in the Marine Corps Division.

Powerful in design. Simple in construction. Economical in operation.

Manufacured in 2- and 3-ton models. An attractive proposition awaits live dealers. Write at once.

**THE DUPLEX-POWER CAR COMPANY,** Manufacturers of Four Wheel Drive Trucks **Charlotte, Michigan**




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The most efficient anti-friction bearings for use in 75% of all places where ball bearings can be installed are

**NEW DEPARTURE BALL BEARINGS**

**American Made for American Trade**

*of the* DOUBLE ROW TYPE
No adjustments needed
None are possible

The New Departure Double Row is a single, self-contained, "fool proof" unit carrying *all* the loads and stresses simultaneously from *whatever* direction they may come, with equal efficiency, and reducing friction to the vanishing point.

*Every truck owner should read the "Brown Book." Send for it.*

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*By*
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**THE CLEVELAND-CANTON SPRING COMPANY**
CANTON, OHIO

# A New Car—THE BESSEMER

**Announce an Internal Gear 1-Ton Truck at**

**$975.00**

**Continental Motor—Bosch Magneto**
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**Torbensen Internal Gear Rear Axle**

***Deliveries November 1st***

The complete line of trucks as follows:

| Model "G" 1-ton Internal Gear | Model "A" 1½-ton Chain | Model "D" 2-ton Worm | Model "E" 3½-ton Worm |
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| $975.00 | $1800.00 | $2000.00 | $2800.00 |

**Write for our Dealers Proposition**

**Bessemer Motor Truck Co., Grove City, Penna.**




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NEVER was the light truck market so bright as now—and never was such an opportunity offered to dealers to meet the demand.

The specifications of Model F ¾-ton Republic Truck are an unanswerable argument as to their quality. *The truck in service proves it*—and the Republic's low prices settle the question of motor haulage in the minds of a multitude of prospects *in your community.*

This famous member of the Republic line of internal gear drive trucks has proved its power and economy worth in all kinds of duty—wholesale and retail delivery—in every service for which a light truck is used.

*The Republic gives you a complete line*—a truck for every purpose—the highest class construction that can be put into trucks at any price—at the very lowest prices at which such trucks can be built.

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|---|---|
| Model F—¾-ton | $ 995 |
| Model E—1-ton | 1275 |
| Model A—2-ton | 1575 |
| Model T—3-ton | 2350 |

Folders illustrating and fully describing each model. Just out—our new three-ton Model T "the new dreadnaught of truckdom."

We want dealers for some select territories. If interested write or wire for appointment. Address Dept. N

## Read These Specifications

**Motor**—Continental—long stroke—3½ x 5. Cooling by thermo system. Bosch high-tension magneto. Stromberg carburetor.

**Clutch and Transmission.** Ten-face dry disk. Selective sliding gears—three forward and one reverse. Heat-treated case-hardened nickel-alloy steel gears. Fafnir bearings throughout.

**Axles**—Front—drop-forged I-beam. Rear—internal gear. Nickel-steel gears. Ratio 6½ to 1. Entire load carried on drop-forged I-beam. Power transmitted through live shafts and internal gears bolted on road wheels.

**Springs**—Front—28 inches long, 2¼ inches wide, 7 leaves. Rear—52 inches long, 2¼ inches wide, 11 leaves.

**Tires**—Firestone—35x3 front, 35x3½ rear; or pneumatic tire equipment, 34x4½ front, 35x5 rear, plain tread Goodrich, no extra charge.

**Steering Gear**—Left side, 18-inch wheel. Center control.

**Frame**—182 inches long and 4¾ inches deep at center. 3-16 material. Pressed steel channel section. Distance back of driver's seat, 98 inches.

**Wheelbase**—124 inches.

**Equipment**—Oil lamps side and rear, horn, tool kit, tool box, flareboard express body 9 feet by 44 inches.

**Electrical Equipment**—Westinghouse igniting, starting, lighting, generating, $125 extra.

**Republic Motor Truck Co.**
Alma, Michigan
U. S. A.

# Republic Motor Trucks

Internal Gear Drive



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# IN A NUTSHELL

**The Krebs**

**The Company**

The KREBS COMMERCIAL CAR COMPANY are experts. They have been building cars and trucks since 1899. Experience that has led to excellence.

**The Truck**

A clean, trim, sturdy chassis. Handsome Renault type radiator. Continental Motor with KREBS Automatic Governor (see below) Timken-Brown Worm Drive. Left Drive, Center Control. Exceptional carrying capacity.

## The Governor

This is the special KREBS feature. The owner controls the truck through the Governor. Set the Governor to any speed from 5 to 20 miles and from the time it leaves the barn it is under automatic control. Under all conditions it will keep an even speed. "The driver steers!"

**Can you afford to overlook this wonderful truck?**

*Made in models of 3/4, 1, 2 and 3-tons with bodies to suit all trades.*

*Write for our proposition*

KREBS COMMERCIAL CAR COMPANY
CLYDE, OHIO, U. S. A.

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ACME
THE TRUCK OF PROVED UNITS

# 14 Selling Superiorities

Secure the early 1916 orders to be placed immediately by business firms in your territory for ACME 2-Ton Trucks.

The ACME has larger truck dimensions on 148-inch wheelbase — more power — 50 per cent guaranteed overload capacity under normal conditions—extra spacious appearance—well balanced and artistic design—and fourteen proved units harmoniously combined, backed by leading American manufacturers.

| | | |
|---|---|---|
| Continental Motor | Timken Bearings | Long Radiator |
| Timken Worm Drive | Warner Clutch | Eisemann Magneto |
| Timken Front Axle | Warner Transmission | Rayfield Carburetor |
| Timken Rear Axle | Detroit Springs | Gemmer Steering Gear |

Smith Pressed Steel Frame Pierce Governor

In the ACME buyers get the benefit of the experience of thousands of truck users—save all experiment.

From starting crank to tail light there is not an experimental feature in the ACME—nothing but proved units.

*Obtain the immediate December orders*

## Clinch the Agency—GET IMMEDIATE TRUCK BUSINESS!

Make the biggest, best class of truck buyers your boosters.

Our territorial proposition lays solid basis for permanent, profitable connection with this strong financial organization.

Act quickly to get this early 1916 business in next 30 to 40 days. Send Coupon for Agency Terms and Agreement—OR WIRE.

*Watch for Announcement of ¾ Ton Truck*

## Cadillac Auto Truck Company

**10 Mitchell Street Cadillac, Michigan**

*MAIL THIS COUPON*

CADILLAC AUTO TRUCK CO.
10 Mitchell Street, Cadillac, Michigan.

Please send all the facts about the ACME 2-Ton Truck and your Agency offer for this territory.

Firm Name .....

Individual .....

Address .....

Present Agent for .....

.....

C. V.

2-Ton ACME with Special Stake Body. Chassis $2,000 Equipped. Special Bodies Designed and Estimated. Has 40 H. P. Continental Motor—3-point suspension unit power plant—genuine gears and general dimensions above standard.



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# CAN YOU READ THESE PERFORMANCE - RECORDS OF

# Troy Trailers

## Without *Acting?*

Newmark & Co., of Los Angeles, California, formerly used two trucks to do the work a truck and Troy Trailer now are doing. Trailer has express body.

W. H. Edgar & Son, of Detroit, bought this Troy Trailer with platform body a year ago. It has saved them a truck and warranted their buying another Trailer.

Five-ton Troy Trailer used by Saxon Motor Company, of Detroit, behind a 1½-ton truck has increased efficiency 453 per cent with only 6 per cent increase in gasoline cost.

The Motor Truck & Terminal Company, of Los Angeles, Calif., has made a saving of 35 per cent per ton mile by the use of a five-ton trailer behind a five-ton truck.

This dump-body Troy Trailer brought an order for another. Both are in service in Harris County, Texas. They are used behind 3½-ton trucks. Trailers have doubled the trucks' efficiency.

Not if you are at all interested in increasing the efficiency of your motor truck—or in hauling just about DOUBLE the tonnage you are figuring on, without appreciably increasing the estimated cost. Read the records—THEN ACT—by filling out, tearing out and sending out the information-bringing blank put here for your convenience.

## The Troy Wagon Works Company

**TROY, Miami County, OHIO**

New York, 1876 Broadway — Detroit, 113 First St. — Washington, D. C., 505 Riggs Bldg. — Chicago, 900 Lytton Bldg.
London, Eng., 49 Pall Mall — St. Paul, 331 American Nat'l Bank Bldg. — Philadelphia, 206 Bailey Bldg.

Please send your Troy Trailer Booklet 4 C. V., containing a full statement of the Principle of the Trailer, a complete description of your Troy Trailers and facts showing economies in use.

Firm Name .....

Individual Name .....

No. ..... Street

City ..... State .....

We operate ..... Trucks. Made by .....

Capacity of Trucks ..... Tons. Material hauled .....




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# Another FEDERAL

American Woolen Company's Federal at Providence, R. I.

## "Use Proves Economy"

American industries are taxing the capacity of the Federal Plant. "America First" is our policy.

The long life and service-giving qualities — the dependability and economy—the sureness of greater efficiency with

**FEDERAL**
**MOTOR TRUCKS**

have guided thousands of American Business Men wisely to Federalized Transportation.

*The Blue Book of Traffic and Actual Costs of Operating in many lines of business are worth your careful attention right now.*

## Federal Motor Truck Co.

DETROIT, 122-130 Leavitt Street MICHIGAN

Largest Manufacturers of 1½ and 3½ ton worm drive motor trucks exclusively.




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F F

# FULLER
## Truck Transmissions

**The highest grade Transmission used by the best Truck builders**

**A new reinforced concrete addition now building will double our plant.**

TU—¾-1 TON TU2—1½-2 TON

*Write for complete data Catalog No. 24*

**Fuller & Sons Manufacturing Co.**
**Kalamazoo, Mich.**



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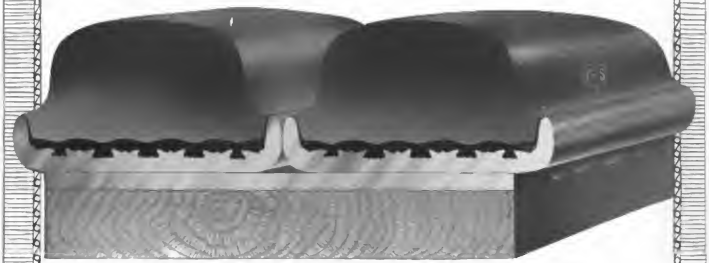
*The New*

# UNITED STATES TRUCK TIRE

**With an improved rubber compound vulcanized under 800 Tons Pressure by a new type Hydraulic Press—the only press of its kind in the United States.**



The new United States Pressed-on Truck Tire has a greatly improved rubber compound. The new compound is the result of thousands of experiments made by the largest rubber company in the world It makes the new Truck Tire give an almost unbelievable amount of extra wear. Then too this improved compound has greater resiliency than any compound that has ever been produced for truck tire use.

## Vulcanized By Extra Pressure Process

For each tire a larger volume of the new compound is used. It is vulcanized under 800 Tons Pressure, or about four times the pressure used for ordinary Truck tires. The result is the removal of all gas and moisture from the rubber, and a perfect union between the rubber and a heavy steel base.

The United States Pressed-on Truck Tire means lower tire expense and reduced maintenance costs.

## United States Tire Company

**Broadway at 58th Street New York City**

**Branches in all principal cities give prompt, liberal and courteous service**

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# Pierce-Arrow Trucks Saved Holbrook, Cabot & Rollins $550 Per Day On Million Dollar Newark Terminal Contract

These well-known contractors employed from ten to twelve Pierce-Arrow motor trucks continuously on the big excavating contract for the Public Service Terminal at Park Place, Newark, N. J. The job called for the removal of earth from an excavation 900 feet long with an average width of 140 feet and a depth of 25 feet below the curb.

In estimating what the cost of doing this work with horse teams would have been it was figured that there was a saving of approximately 60 per cent. in favor of the motor trucks. The net saving on this basis would amount to $550 per day. Mr. T. B. Bryson, Vice-President of the Holbrook, Cabot & Rollins Corporation, writes us on this point:

*"Replying to your letter of December 3rd, regarding Pierce-Arrow trucks on work at Newark, would say that it would be impossible to have done the work in question with horse trucks on account of the length of the haul and also the fact that we could not have gotten the teams to the shovel and away with dispatch enough to have loaded the yardage which we were loading per day."*

The trucks were worked eighteen hours per day with two shifts of drivers, averaging 154 miles per day. The operating expense was 18 cents per mile and the yardage cost figured out approximately 32 cents per yardage removed.

All Pierce-Arrow Trucks are equipped with the worm-gear drive, which is a positive guarantee of effective service under the most difficult conditions.

Other interesting details of costs, loading facilities, etc., are given in our recently published booklet, "What Pierce-Arrow Motor Trucks are Doing in the Contracting Business," which we shall be glad to send to any contractor interested.

PIERCE-ARROW
MOTOR CAR CO.
BUFFALO NEW YORK

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# Increased Facilities

EVIDENCING our promise to do everything humanly possible to take care of the present greatly increased demand for Brown-Lipe Differentials and Transmissions and to provide means for accepting at least a part of the considerable business that has been offered to us, but which we could not accept, work has been started on an enlargement of the Brown-Lipe-Chapin plant.

This enlargement which will involve the expenditure of $750,000 will give us practically 50% increased capacity. The new addition will be six stories high, 190 x 70 feet of reinforced concrete, corresponding in the exterior appearance with the main building erected six years ago.

The case hardening plant will also be doubled in capacity, work also commencing on that immediately.

With the completion of the new additions more than 2000 persons will be carried on the payroll. Our plans call for occupancy of the new addition early in the spring.

**BROWN-LIPE GEAR Co**
TRANSMISSIONS
**SYRACUSE, NEW YORK**
DIFFERENTIALS
**BROWN-LIPE-CHAPIN Co**

NEW YORK: Thos. J. Wetzel, 29 W. 42d St.
CHICAGO: K. Franklin Peterson, 122 So. Michigan Ave.
DETROIT: L. D. Bolton, 2215 Dime Savings Bk. Bldg.
SAN FRANCISCO: A. H. Coates, 444 Market St.

Foreign Agent, Benjamin Whittaker, 2, Norfolk Street, Strand, London, W. C.

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# Motor Truck Supremacy

CHASE Motor Trucks are without a peer in the qualities that make for the greatest service efficiency—the greatest operating economy.

Simple, Powerful, **Water-Cooled Motor—Dependable Worm Drive—Unit Power Plant—Dreadnaught Frame—first quality materials and Master truck building**—account for CHASE supremacy.

These are the factors that determine a motor truck's service, success and economy. In CHASE Trucks, these factors have been brought to the **very extreme of mechanical excellence.**

# 5,000 Chase Trucks

are daily demonstrating that they can and do make their service performances reach the limit of dependable, economical trucking efficiency, under every working condition.

Investigate CHASE Truck Service and you will find it to solve your trucking problems as satisfactorily as it is doing for others.

## Get "CHASE-'EM"

Ask us to place your name on our mailing list for "CHASE-'EM," a newsy monthly magazine worth while. Also write for literature.

## Chase Sizes and Prices

| | |
|---|---|
| ¾ Ton | $1500 |
| 1 Ton | 1650 |
| 2 Ton | 2200 |
| 3½ Ton | 3300 |

*CHASE Trucks and Special Sales Plan are Trade Builders for Dealers*

*Ask About This*

## CHASE MOTOR TRUCK COMPANY

102 WEST STREET SYRACUSE, N. Y.

**"Chase Your Delivery"**




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COVERT

TRANSMISSIONS

The name COVERT is an assurance of service and satisfaction. It stands for quality. It represents efficiency. It signifies simplicity of construction. It assures durability. It indicates the greatest transmission value. It means economy in assembling and of operation. It's the name that will help sell your product.

We make transmissions for all types of pleasure cars and trucks. Consult our engineers concerning your requirements.

COVERT MOTOR VEHICLE COMPANY
FACTORY, LOCKPORT, N.Y. SALES OFFICE, DETROIT, MICH.



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# International Motor Trucks

# At Reduced Prices

WON MEDAL OF HONOR SAN FRANCISCO EXPOSITION

## A Better Truck At A Lower Price

***Prices quoted here are cash f. o. b. Akron, Ohio***

**Model MA—1000 pounds** capacity, air-cooled

With 2-in. solid tires front and rear..... **$600**
With 36-in. x 4-in. pneumatic tires..... **650**

**Model M—1000 pounds** capacity, water-cooled

With 2-in. solid tires front and rear..... **$710**
With 36-in. x 4-in. pneumatic tires..... **760**

**Model E—1500 pounds** capacity

With 2½-in. front and 3-in. rear solid tires..... **$950**
With 36-in. x 5-in. pneumatic tires..... **1000**

**Model F—2000 pounds** capacity

With 3½-in. front and 4-in. rear solid tires.... **$1500**
With pneumatic tires 4½-in. front, 6-in. rear.... **1550**
(Prices on Model F are for chassis only)

Increased factory production made necessary by our large 1915 sales enables us to offer regular models of International Motor Trucks at prices heretofore unheard of in the motor truck industry.

Compare the trucks shown here with any trucks of equal capacity. Buy where you find the best VALUE.

The basis of International Motor Truck success is SERVICE. We make it our business both BEFORE and AFTER a sale to see that our customers get full value for every dollar spent.

Thirteen thousand users of International Motor Trucks testify that they are worth the old prices. At these new prices, the lowest ever made for trucks of equal quality and capacity, International Motor Trucks are far and away the best bargain in the motor truck market today. Write to the address below for full description of these trucks and complete information.

## International Harvester Company of America

**(Incorporated)**

**88 Harvester Building** **Chicago U S A**

***Agents Wanted in Unoccupied Territory. Write, 'Phone or Wire***
***Service Branches in 88 Principal Cities***



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**Semi-floating Construction**

**Ball Bearings for Worm Loads**

**Drive Through Rear Springs**

**Brakes on Rear Wheels**

Herewith is shown a United Truck chassis, in which the driving strain is taken through the rear springs.

# SHELDON

## WORM GEAR AXLES

Note the simple, clean-cut appearance of this chassis; with the absence of torsion tubes, radius rods, truss rods and other weight-adding complications.

And yet, even the layman can see that here is a strong, durable, construction that must register great efficiency. Such advanced construction is possible only with Sheldon Worm Gear Driven Axles.

## The Sheldon Axle & Spring Company

*Makers of Springs and Axles for More Than 50 Years*

**Wilkes-Barre** **Pennsylvania**

Chicago: 122 S. Michigan Boulevard Detroit: 1215 Woodward Avenue San Francisco: 444 Market Street




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## The Solution of all Transportation Problems Involving Loads of from ¾ to 3½ Tons is Worked Out Efficiently, Economically and Finally by

# DIAMOND T TRUCKS

The addition of a 1500-lb. Worm Drive Model to the DIAMOND T Line of Trucks would do no more than mark a step in our progress were it not for the fact that this model enlarges the scope of DIAMOND T TRUCK efficiency by covering the light delivery field.

Business men whose problem fully or in part would find its best solution in a truck of that capacity, need have no hesitancy about its fitness.

With such concerns as The Standard Oil Company, The American Can Company, The Boston Store and hundreds of other successful business houses, big and little, using DIAMOND T TRUCKS, singly or in fleets, all with unqualified satisfaction, is an endorsement of DIAMOND T engineering ability and business integrity.

DIAMOND T MOTOR CAR CO. CHICAGO. ILL. U.S.A.

DIAMOND T

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# The Endorsemen

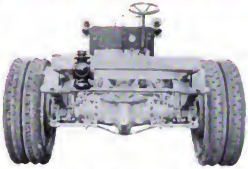
DIAMOND T TRUCKS enjoy the prestige of working in the service of some of the most representative industrial organizations in this country. They earned this prestige on merit.

When a concern is large enough to have every branch of its activities departmentized—every detail of each branch handled by men of specialized experience—and when these men know that their success in their chosen fields depends upon the results that attend the moves they make, there is slight chance of mistakes being made—no chance for sentiment.

So when we point to the DIAMOND T TRUCKS in use by business houses of nation-wide prominence, we point to instances where there is no room for doubt but that DIAMOND T TRUCKS won their prestige on merit, and merit alone.

In this particular instance we point to the practical endorsement of DIAMOND T TRUCKS by big business as an incentive for any concern whose hauling problem involves ¾-ton loads to investigate the latest member of the DIAMOND T TRUCK family—the ½-ton Worm Drive chassis.

# of Big Business



Whatever efficiency, whatever economy, whatever satisfaction other DIAMOND T TRUCKS have given in the fields they are designed to work in, the new DIAMOND T ¾-Ton Worm Drive TRUCK will give in its field.

**The Price—$1175.00 (Chassis with Seat) $50.00 Extra for Express Body as Shown**

THE SPECIFICATIONS:

Continental Motor, 3½ x 5 in.
Timken Front Axle
Timken Rear Axle
Timken-David Brown Worm Gear
Spicer Universal Joints
Gemmer Steering Gears
Wheelbase, 126 inches
Rayfield Carburetor
Bosch Magneto
Long Radiator
Brown-Lipe Transmission
Brown-Lipe Clutch
A. O. Smith Frames
Schwarz Wheels
Mather Pure Chrome-Vanadium Springs

## THE DIAMOND T LINE

| | | |
|---|---|---|
| ¾ Ton Worm Drive Chassis | $1175 | F.O.B. Chicago |
| 1 Ton Worm Drive Chassis | 1485 | F.O.B. Chicago |
| 1½ Ton Worm Drive Chassis | 2050 | F.O.B. Chicago |
| 2 Ton Worm Drive Chassis | 2200 | F.O.B. Chicago |
| 3½ Ton Worm Drive Chassis | 3300 | F.O.B. Chicago |

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# An-
# nouncement

The Diamond T Motor Truck Co. of New York, Inc., with headquarters at 245 West 55th Street, New York City, will handle the sale of DIAMOND T TRUCKS in New England, New York, Eastern Pennsylvania, New Jersey, Delaware, Maryland and the District of Columbia, together with all export trade.

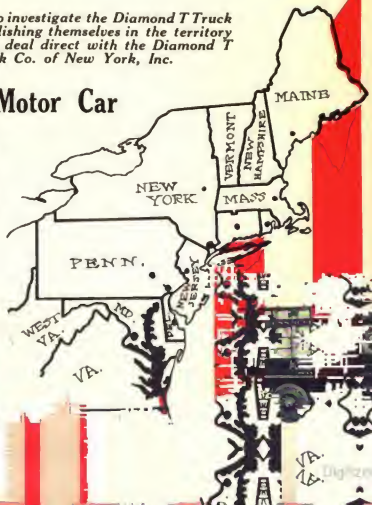
Mr. F. B. Porter, and F. W. Drecktrade of the above Company, have had a world of practical experience in the truck business and their services in analyzing and diagnosing hauling problems will be found almost invaluable.

It is with utmost confidence that we are placing our eastern and export business in their hands and we solicit consideration of all truck users for their company.

*Dealers who desire to investigate the Diamond T Truck with a view to establishing themselves in the territory outlined here should deal direct with the Diamond T Motor Truck Co. of New York, Inc.*

## Diamond T Motor Car Company

Chicago,
Illinois,
U. S. A.

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# On the Great Map of American Business *this* is the Truck

THE installation of any good truck is a step toward ***better*** trucking. But business men are coming to know that ***most profitable*** trucking means more than the mere purchase of a good truck.

It means the careful consideration of all the conditions surrounding the handling of goods and the selection of proper equipment to meet these conditions.

***GMC*** Trucks are built for every conceivable commercial use. The line includes trucks ranging from 1,000 pounds to 6 tons capacity. It includes gasoline and electric power, worm drive, chain drive and shaft drive.

In no other factory in the world can such a variety of motor trucks be found. In no other factory can better quality or better values be had.

That's why ***GMC*** Trucks loom big on the map of American business. That's why we operate the world's largest exclusive motor truck factory. That's why satisfied owners in 135 different lines say, "this is the truck"

When you begin to consider your hauling proposition we will gladly offer suggestions, if you desire, and co-operate with you in helping you to select the kind and size of trucks that will serve you best.

Our suggestions should be helpful for we have no prejudice in favor of any particular size of truck or kind of power.

Simply tell us what you have to haul, the kind of roads you have, whether hilly or level, and we will send you facts and figures.

## GENERAL MOTORS TRUCK COMPANY

***One of the Units of General Motors Company***

**PONTIAC, MICHIGAN**

*Direct Factory Branches: New York Boston Chicago Philadelphia St. Louis Kansas City*

*Truck* GMC GENERAL MOTORS COMPANY TRUCKS *Headquarters*



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# In the "Iron Grip" -- But Too Hard to Hurt

## SKF BALL BEARINGS

Only a dent in the vise—that's all. The Swedish Crucible Steel balls used in S.K.F. Ball Bearings are so hard and resilient that they will not crush under this most severe test.

If you should try to crush a ½" S.K.F. Ball by squeezing it in a vise you would have to exert a pressure equal to a load of 33000 lbs. Literally, they are a tower of strength and hardness.

This should be important to you, because the hardness of the double row of balls means proof against wear and enduring reliability is assured.

**SKF BALL BEARING CO.**

50 Church Street New York City




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## Four-Wheel Drive Specifications

Wheelbase—3 ton, 122 inches; 6-ton, 140 inches.

Steering—Motor power (operated by hand lever) on all wheels giving positive action to a powerful, sure, fool-proof steering device which makes a remarkably short-turning radius.

Axles—Special patented full floating Bearings—Rhineland.

Motor—3 tons, 4¼ x 6½ Waukesha, 3½ x 7 Morton.

Transmission — Morton Selective 4 speeds forward, 1 reverse. Double worm drive to all wheels.

## Morton Worm Drive Specifications

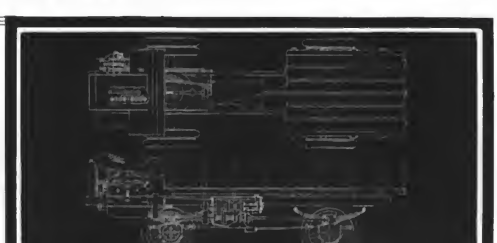
Motor—Continental—4 cyl.—4 cycle.

Carburator—Carter.

Ignition—Bosch.

Lubrication — Positive plunger pump with constant level.

Centrifugal water pump. Hele-Shaw clutch. Selective transmission. Lever control. Right hand drive. Solid forged axles. Worm-Wheel of special phosphor bronze. All other equipment equally reliable.



Showing the equal power distribution of the Morton Four-Wheel Drive assembly

# MORTON

Four-Wheel Drive equally distributes the propelling strain over the four axles giving the highest efficiency because every pound of energy is turned into a distributed tractive effort. Morton Four-Wheel Drive Trucks in 3 to 6 ton capacity, are built to withstand the hardest usage and to mount the heaviest grades.

**Morton Worm Drive Trucks**

**1½—2—2½—3½—5 Tons**

Are the perfect vehicles of the light truck field.

## Extra Money For You

Aside from the regular truck business you can increase your earnings and the efficiency of your local fire department by interesting town officials in the finest combination hose and chemical wagon ever built.

Designed by capable engineers who provided every conceivable means for making this a dependable fire fighting unit that will get to a fire, regardless of the road it has to travel. The Morton Hose and Chemical Wagon is built of the best material, by the most skilled mechanics obtainable.

Electric starting, lighting and ignition systems are installed in such manner as to make failure to operate an impossibility. Simplicity is the keynote throughout.

Motor—Continental—6 cylinder four cycle, water cooled, 4¼ x 5¼—60 H. P. of the unit power plant type. Starting and Lighting—Jesco Combined Starting and Lighting Systems. Carburetor — Carter. Drive—Worm Gear. Brakes—service and emergency on rear wheels. Steering Gear—Irreversible type.

Guaranteed against defective workmanship or material for one year.

Equipment—2 35-gal. chemical tanks connected with by-pass, 200 ft. of ¾-in. chemical hose, 1 extension truss ladder, 1 solid side roof ladder, 2 axes, 2 bars, 8-ft. pole, 2 3-gal. hand extinguishers, acid receptacle, plug for nozzle and all tools for operating tanks and devices.

Morton Truck and Tractor Company's combination hose and chemical wagon.

*Dealers—Communicate for Open Territory*

**Morton Truck & Tractor Company**

Harrisburg Pennsylvania



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# Commerce 1916

## FOR LIVE DEALERS

The successful dealer in motor trucks is the one who is quick to see the selling possibilities of a truck which most efficiently meets the demands of one particular field of truck service.

The COMMERCE Line of 1500-lb. Delivery Trucks for 1916 will especially recommend itself to this type of dealer.

Series "N"—the COMMERCE Line for 1916—is the result of the experience gained in six years of successful truck building applied to the problems to be met by a high class delivery truck. Our past experience in truck building has been confined to this one type of truck and into our 1916 models we have put "all we've got." The result is a truck with all the points of merit that the wise dealer will readily recognize as most valuable selling points.

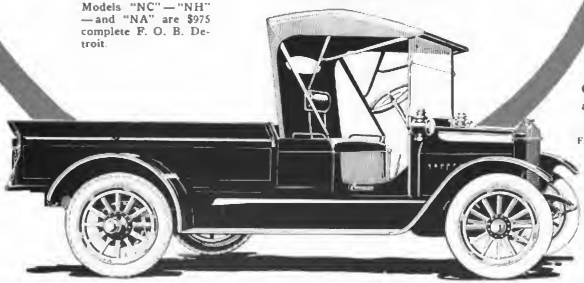
Series "N" comprises Models "NC," for the grocery, department store and general trade where a high class body of the enclosed type is required—Model "NH," a truck with a standing top and rolled waterproof curtains, allowing it to be converted quickly into a closed body—and Model "NA" of the open express type with flare boards, driver's top and tail gate, especially adapted for the hardware, baggage, plumbing and gas company trade.

This chassis is furnished complete with Windshield, Hood, Fenders, Running Boards, Gasoline Tank, Dust Shields and Lamp Equipment, Tools, Pump, Jack and Tire Outfit.

Models "NC"—"NH"—and "NA" are $975 complete F. O. B. Detroit.

**Chassis only, $875**
F.O.B. Detroit

**Commerce Motor Car Co.**
Detroit, Mich., U. S. A.



Complete as Shown
**$975**
F.O.B. Detroit



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# DETROIT

# SPRINGS

TRUCKS, unlike pleasure cars, are bought on the basis of cold commercial calculation. Unless they give 100 per cent service in return for every dollar invested in them they are deemed a poor buy.

It is the peculiar function of Detroit Truck Springs to insure the truck investment. This they accomplish by vigorously defending the vital parts of the truck against jars, jolts and the ravages of road shock. Each set of Detroit Springs is designed especially for the particular model of truck for which it is intended. There are no "stock" springs bearing the D. S. P. trade-mark. Every Detroit Spring therefore is guaranteed in writing for a period of two years.

Investigate this sort of truck insurance. Send a post card today for the booklet "From the Ore to the Motor Car." It will tell you how good truck springs are made.

REGISTERED Detroit Springs SILENT—SELF-LUBRICATING

**Detroit Steel Products Company**
**2260 East Grand Boulevard, Detroit, Michigan**




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Overland
TRADE MARK REG.
*Delivery Cars*
*Price f.o.b. Toledo*

# Give the Shipping Room a Chance

Your office has its time-saving devices. Your sales force its up-to-date system and methods.

How about your shipping department?

One day with your driver will convince you that you can save money by using motor delivery.

Your competitor is advertising his up-to-date business methods every time one of his cars makes a delivery.

He is both saving and making money.

Motorize your business with the Overland delivery car.

The price of the car is astonishingly low—the cost of operation exceedingly small.

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# Hundreds of Dollars

were spent by one business house to finance an investigation of dry goods delivery methods in New York City, the business of just one store.

The investigation and compilation of its results took many months to complete.

They are published in this issue for the first time.

The work has a high value to all persons interested in dry goods parcel delivery problems, to all persons who are connected with the department store trade, who sell motor trucks to that trade, or who operate commercial vehicles in similar lines of work.

It is the sort of thing that

The COMMERCIAL VEHICLE

does all the time.

## It was Worth the Price

which the above business house had to pay to secure this data, but you can get it all for 20 cents, the price of one issue of this magazine. For two dollars you can get infinitely more—a whole year of such data—Twenty-four copies of the only magazine in the world which has a record of years of endeavor along the exact line covered by the above study.

Most of the findings of the institution which made the New York dry goods investigation have been published in this journal repeatedly on previous occasions. Doesn't this prove that in nearly 10 years of experience, we have learned how? That our deductions are reliable?——More of this later.

### *By the Way—*

**The annual technical review of the motor truck industry and specifications of all important motor trucks on the American market will be published for the fourth consecutive year in the January 15, 1916, issue of this magazine.**




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The COMMERCIAL VEHICLE
Read by Business Men

Vol. XIII December 15, 1915 No. 10

# Motor Efficiency Proven By Macy & Co. Investigation

## Massachusetts Institute of Technology's Report of 3-months' Study Shows How and Why Dry Goods Stores Should Use Motor Trucks

MOTOR TRUCKS effect economy in department store delivery. Their use should be widened. They provide quicker delivery. They reduce the required number of sub-stations. They waste less time than horse vehicles, they move faster and therefore accomplish more work. They are more convenient and permit faster work on the part of deliverymen.

Motor truck success depends upon proper selection of equipment for the work to be done. Loading delays must be minimized. Ample assistance must be given the driver, but too many helpers defeat their own purpose. Collections and calls for goods to be returned take excessive time, due to customers' carelessness. Accurate, complete and accessible records, both of cost and performance, must be kept in a systematic manner if a store is to attain and maintain delivery efficiency.

Such is the gist of the report of an

1—Many of the regulations governing the deliverymen must be broken if the men are to complete in a reasonable time the amount of work now assigned to them. The rules which are generally disregarded include those in regard to backloading, the delivery of all paid purchases by the driver, the handling of the money by the wagon boys, and the leaving of the wagon unattended, especially in the city districts.

2—The drivers in general travel over their routes in a very efficient manner. The course taken as a rule is the best one for the particular load.

3—In the cases of drivers who find it necessary to list the pieces in their load in the order in which they are to be delivered, there would result a saving of time if the drivers had an address slip for each purchase in the load, which slips could be arranged by the driver in the desired order for making the deliveries. The present sales slips could possibly be detached from the parcels and used in this manner, or an additional copy of the address slip could be used.*

4—On routes on which but one delivery per day is made the vehicles should leave the store or depot early enough to reach their first delivery at about 8 a. m. In a few cases this will necessitate the men reporting for work rather early, but on account of better delivery conditions in the morning their time on duty would be decreased.

5—A broad canvas strap with snaps at each end would be a great aid to the driver in building up and holding parts of his load in place. The strap should be at least 12 inches wide and in length equal to the inside width of the vehicles.

6—A complete set of forms for obtaining detailed performance and cost records for each type of vehicle in each class of service is outlined.

7—Where motor vehicles are now used they are operating at as low a cost, and in many cases at a lower expense per piece, than could be obtained with horse-drawn vehicles in the same service.

8—An appreciable saving could be effected by a more extensive use of electrics in the city service.

9—The Newark territory and the suburban territory on Long Island offer a field in which gasoline trucks could be used with an appreciable saving in cost over the horse wagons now used.

10—Flushing, Far Rockaway, Hempstead, and Port Washington could be served with advantage from a single depot. If motors were used the present delivery territory could be extended to include Roslyn, Oyster Bay, and Huntington.

*Editor's Note:—This is already done by the May Co., and Halle Bros., in Cleveland, O.

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investigation of delivery conditions in the Macy store in New York by transportation experts from the Massachusetts Institute of Technology.

The investigation of the delivery system of R. H. Macy & Co., New York City, was conducted by the Research Division of the Massachusetts Institute of Technology, Boston, Mass., by H. F. Thomson, H. L. Manley and A. L. Pashek. It extended from February to July, 1914, and embraced a close scrutiny of the records of the concern, a thorough study of all conditions, both within the store and outside of it which have a direct bearing on the work of delivery, and protracted observations of operations within the store and on the trucks while on their routes.

### A Disinterested Study

That it was made by technically-trained and qualified experts under the supervision of an institution which had no object or motive other than the collection of data of educational value to transportation engineers and users of all kinds of delivery equipment, renders the report valuable and reliable no less than it was paid for by R. H. Macy & Co. themselves.

This is the first appearance in print of this report, whose issuance has been delayed by the great amount of work incident to the proper study and arrangement of the data secured in the investigation. The declared objects of the research are:

1—To give a method of analysis by which the cost data available in any large department store can be utilized in computing the delivery cost per piece, per delivery, or per day, in such way that the department stores might work out their own delivery costs and to do so continuously in order to get the best possible delivery service at a minimum reasonable cost, without being obliged to employ consulting engineers or other outside advice in obtaining their unit costs.

2—To point out to the general public the complexity of the delivery problem and the share of their responsibility for a great many of the delivery conditions which contribute to increase the delivery costs and therefore the cost of the articles purchased from and delivered by department stores.

The work will be published by the Institute in book form at a later date as "Vehicle Research Bulletin No. 6," to complete a series of five others previously published.

### Why Motors Are Best

This 3 months' investigation of delivery in New York City and its environs shows that the electric vehicle in parcel delivery work for a large department store travels approximately 20 per cent faster than horses in the built-up and congested sections of the city; whereas in the suburban districts an increase of 60 per cent in speed over horse vehicles is shown. In the built-up section of the city in all kinds of work the time consumed in each stop for making delivery is less with an electric vehicle than with a horse vehicle in the same work.

The average time of stops as shown by Table I is 2.5 minutes for horse vehicles, as compared with 2.3 minutes for the electric.

This is a small difference when one stop is considered, but when it is considered that from eight to fifty-three stops per mile are made and that the car is operating 10 hours per day and 300 days in the year, this small economy of time per stop becomes of considerable importance.

When making bulk deliveries to the same built-up sections of New York City the time per stop of horse wagons averages 7 minutes over a 3-months' test, as compared with 5 minutes for the electric, which is averaged over the same period.

Part of this 2-minute economy in stops is accounted for by the fact that the bodies on the electrics are more convenient for the drivers, the body being closer to the ground and the seat lower, thereby facilitating ingress and egress.

In parcel and bulk delivery to Brooklyn and Jersey City the average delivery stop for the horse vehicle was 2.9 minutes, as compared with 2.7 minutes per stop for the electric.

### C. O. D.s Delay Delivery

The Macy investigation demonstrated that there is considerable difference in time required to make different deliveries, such as Call, C. O. D. and Paid.

Paid deliveries, that is, delivering packages that were paid for at the store, consume one-third less time than either the Call or C. O. D. deliveries. In an average based on 3 months examination, the average length of stop for all kinds of parcel deliveries was 3.1 minutes in the built-up section of New York City. Paid packages averaged 2.4 minutes per delivery, as compared with 3.6 and 3.8 for C. O. D. and Call deliveries, respectively.

In bulk delivery in the same district the Paid delivery is still the speedier, but the difference is not so great between it and the Call or C. O. D. deliveries. The figures are: Paid, 5.4; C. O. D., 6.9; average, 6.2 minutes.

Other deductions regarding parcel and bulk deliveries can be made from Table I.

What would seem to be of even greater importance than the length of stop per delivery is the question of whether it is better to have two boys or only one accompany each delivery wagon. The Macy investigation goes to prove that one boy is better than two. If the driver and the two boys each worked as efficiently as the driver and one boy, then the standing time of the vehicle with two boys would be reduced by one-third, or from 2.5 minutes per stop to 1.7 minutes per stop, instead of only 2.3 minutes, as is really the case. The comparison is clearly shown below:

Driver and one boy.....2.5 min. per stop
Driver and two boys....2.3 min. per stop
Driver and two boys should be 1.7 min. per stop.

### One Boy Better Than Two

In other words, examination shows that the two-boy system is not nearly so efficient as it should be. This seems to be due to the fact that the two boys will not work so hard when together as when they go alone on vehicles.

The effect of the two-boy system has an influence on the driver, who also seems to work below capacity; in a word, it seems another exemplification of the old idea: "two is company but three is a crowd." In the 3 months' observations in which the driver also assisted in making deliveries to houses from the vehicle, his average time away from the vehicle was 2.9 minutes with one boy, but when two boys were along this rose to 3.4 minutes per stop, an increase of 15 per cent in the length of the stop.

The question of time consumed in loading the vehicle at the store, time consumed in making deliveries and time consumed while the truck is moving on the street is well answered in Table II. In all kinds of delivery both in the City of New York as well as suburbs and in parcel and bulk delivery all of the motor and horse vehicles were on the road more than two-thirds of their time. Some of the electrics making deliveries in residential districts in Brooklyn, Jersey City and the Bronx were on the road 87 per cent of their time, as against 78 per cent for the horses making delivery in the same districts. Likewise the vehicles in parcel delivery service bear the same relation, the electrics averaging 79 per cent of their time on the road, as compared with 66 per cent for horse vehicles.

### Electric Superiority Consistent

The consistent excess of efficiency of the electric over horse vehicles was extended also to Bulk delivery service, where the electrics spent 72 per cent of their time on the road, as against 64 per cent by horses. The average time of all vehicles spent on the road was 79 per cent.

This time on the route includes the time while the vehicle is moving on the road or street and also the time it is standing while deliveries at houses are being made, and while the resultant figure is no measure of delivery efficiency it points out clearly the percentage of time lost in loading and checking operations. What this effect is on loading time is indicated by the fact that loading and checking delay amounted from 13 to 33 per cent of the total truck time in the various lines of work.

The electrics spent one-fifth less time at the loading platform than horse vehicles in parcel delivery work for the built-up sections of New York City, the figure being electric, 21 per cent; horse wagons, 26 per cent, time spent at loading platforms.

In combination parcel and bulk delivery for residential sections the horse vehicles were over 25 per cent longer at the loading depots than the electrics, the

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figures being: horses, 17 per cent; electrics, 13 per cent.

In bulk delivery for the built-up sections of New York both horses and electrics required 28 per cent of their time for loading. The longer time needed for loading bulk delivery is due to the fact that these packages cannot be sent to the shipping room on the belt conveyor. All bulk packages have to be carried down in the elevator and they must be packed and sorted in floor bins. Because of their inconvenient shape and size it requires longer to assemble them and load them.

### Electrics Need No Stable

The loss of time of vehicles traveling from the stables to the store and back is nil in electrics, as they are garaged at the Macy store, whereas with horse vehicles the loss reaches as high as 11 per cent in the Furniture trucks and ranges from 6 to 8 per cent with the other horse vehicles. This loss is unavoidable with horse vehicles, as the horses must be stabled at a distance from the store, while the electrics can be garaged and charged adjacent to or in the basement of the store.

R. H. Macy & Co. operate one of New York's most prominent department stores, the business being conducted on a cash or C. O. D. basis. All deliveries within the region of Greater New York, embracing the city itself, points on Long Island as far out as Hempstead, points up Long Island Sound to the northeast of the city as far as Post Chester, N. Y. points up the eastern bank of the Hudson river to the north up to and including Hastings-on-Hudson, and New Jersey centers north, west and south as far as Paterson, Plainfield and Seabright, N. J.

The city territory comprises the Island of Manhattan as far north as One Hundred Fifty-fifth street. The residence area includes upper Manhattan and the Bronx from One Hundred Fifty-fifth street to Kingsbridge and Fordham road, all of Brooklyn, Jersey City and Hoboken. All else, including points in the Borough of Queens, Long Island, the Borough of Richmond, or Staten Island, northern cities up the river, along the sound and in the intervening hills, and New Jersey points other than the two mentioned, are suburban and are not served direct from the store.

### Horse Work Is Limited

In the city territory, parcels and bulk packages are delivered separately, horse wagons serving the close-in sections in both classes and electrics all deliveries not in the horse zones.

In the residence sections, both parcel and bulk goods are delivered together, the territory being divided into three zones, one of which is served by horse wagons, another by electric trucks and a third by gasoline trucks. In the city and residence sections all furniture is delivered in separate horse wagons or gasoline trucks.

Suburban deliveries are made from substations or depots, of which there are seven. The goods is shipped from the store to these depots, sorted there, and delivered by vehicles which are maintained in these depots. Horse wagons are used at all sub-stations excepting one, this one being at Woodlawn and serving the whole northern section. Others are at Hackensack, serving the northermost New Jersey points; at Newark, serving central and western New Jersey towns; at St. George, Staten Island, serving points on the island; at Flushing, covering the northern Long Island region, and at Far Rockaway, for the southerly and beach cities on Long Island. The last of the sub-stations is at Sea Bright, N. J., which serves the southern points along the New Jersey shore in season only.

Conclusions reached by the study comprise a number of possible changes in the delivery system suggested by the points covered, a set of suggestions and an elaborate system for keeping track of delivery costs and performance for the purpose of arriving at unit costs for the work done by different agencies.

In a separate column at the beginning of this discussion the ten suggestions made are to be found. The record system follows later. The possible changes and the reasons therefor follow:

### More Motors Needed

"The company could safely replace a number of its horse-drawn vehicles in the city service by electric trucks, provided the routes were rearranged to allow for the greater amount of work per day done by the electrics as compared to the horse wagons, due to the greater speed of the former.

"The gasoline trucks at Woodlawn make a favorable showing compared with the horse-drawn vehicles at the other depots. In comparing Woodlawn with the other depots, account should be taken of the differences in the density of deliveries in the various suburban territories. A plot of the east per delivery vs. the number of deliveries per mile showed that in suburban territory the cost of delivering decreased as the density of deliveries increased.

"It would seem that gasoline motor trucks might be more extensively used in suburban deliveries, particularly in the territory served from Newark and the suburban territory on Long Island.

"At present the Long Island territory is served chiefly from depots at Flushing and Far Rockaway, from both of which horse wagons are operated. Motor service from the store is maintained to the Port Washington and Hempstead districts. It was suggested that all of this territory could best be served from a single large depot. Although estimates of the expense of operating such a combined depot, either with horses or motors, were not justified from the data at hand, the study has suggested that a change could be made with advantage in that the establishment of a large depot at a central point, such as to the eastward of Jamaica, would permit the extension of the delivery service to include Oyster Bay and Roslyn. On account of the long distance these extended routes could probably best be handled by gasoline trucks, in which case neither the Oyster Bay nor the Roslyn districts now have sufficient business to warrant daily service to each, so that a single truck could serve both routes by covering each on alternate days. The real-estate development which is now going on in this entire district would indicate that ultimately both routes would need daily operation."

Variation in the volume of work handled on different days of the week amounts in a typical week to as much as 17 per cent in one week, Tuesday being the heaviest day and Friday the lightest. This naturally means that an additional burden is thrown on all departments in the delivery section on the rush days.

Another study covered delivery costs. A complete audit of delivery expenses was not made, as such was beyond the scope of the Institute's work, but a very comprehensive survey was compassed.

Comparisons between different classes of equipment in the same work were only possible in a few cases, while comparisons between classes of goods in different zones was impossible because most of the goods is delivered *en masse*. Also some of the more definite cost figures were vised in confidence and were therefore not available for publication.

### Cost Figures One-sided

From the company's own figures for 6 months preceeding the study it was determined that, figured on a basis of vehicle-days, the motor trucks of all classes almost without exception cost more than the horse wagons; but that when the greater amount of work done was considered, considerable economies were effected by the motors. Tables III and IV show the same cost figures expressed, one in terms of vehicle-days and the other as to piece delivered.

In parcel delivery, in the congested area it was found that horse vehicles average $8.56 in cost per day, as against $9.33 for the electrics. The greater amount of work accomplished by the electrics, however, produced a package cost 5.3 per cent less than the horse vehicles, on a basis of ratio of the cost per piece in this work to the average for all kinds of delivery.

Similarly, in bulk delivery in the same territory, the electrics were found to be 12.6 per cent cheaper than horses and the gasoline trucks 28.8 per cent more expensive than horses.

### Gasoline Trucks on Long Hauls

How much of this difference in gasoline and horse cost was due to the fact that the gasoline trucks were given runs of greater distance with fewer stops per mile is indicated in the following observations in the report:

"In comparing these figures it should be noted that the electric vehicles are serving routes more distant from the store than are being served by the horse wagons, the average distance from the store of the electric routes being 4.4 miles and the average distance for the wagon routes 1.7 mile. A rough estimate shows that were the electric vehicles used in the present horse-drawn zone, the cost would be approximately 53 per cent of the average cost for the entire system, and were horse wagons used on the present electric routes, the cost per piece would be approximately 65 per cent of the average cost for the entire system."

Speaking further in reference to the showing on the parcel and bulk service in the residence districts, the report states that the average distance from the store of the electric routes is 6.7 miles, those of the horse wagons being but 3.7 miles, and the gasoline routes farther even than the electric routes. This would indicate that the horse vehicles if obliged to operate on the same routes as the gasoline trucks would give an even higher cost than the gasoline trucks do.

### Complete Cost Records Important

The importance of accurate, comprehensive and accessible records of performance and expenses is strongly emphasized in the report. Instead of the previous scheme of having the delivery accounts kept by a number of different branches of the delivery department, each in a different way and with little relation to the records kept by other departments, rendering data incomplete oftentimes and always difficult to assemble, the investigators advise that all delivery accounting be turned over to the auditor's office, and prescribe a set of forms peculiarly fitted to this particular

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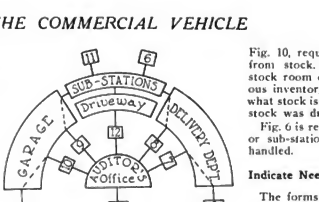
use. A scheme is also advised whereby the performance records are turned in to the delivery superintendent before being passed on to the auditor.

### A Seven-form System

The system advised consists of seven forms, Figs. 6 to 13. These forms are designed to be filled out and used as indicated in the accompanying diagram. In this diagram, the auditor's office represents the hub of all accounting, making up a monthly summary of truck expenses, Fig. 13, from five forms handed in from three sources.

Two of these forms, Figs. 7 and 8, are sent in by the garage superintendent, Fig. 7, a summary of daily performance from the store, and Fig. 8, a summary of depot performance.

Another form sent to the auditor is Fig. 12, sent in by the man in charge of the driveway, which shows the performance of the transfer trucks used to carry goods from the store to the various sub-stations.




Plan of accounting scheme advised by Massachusetts Institute of Technology for department stores, showing various departments and the forms which contribute to Form 13 issued by the auditor's office. Numbers refer to figure numbers of forms shown on page 21

The garage sends in two forms, Fig. 9, a daily garage report of all vehicles, including those at the sub-stations, and Fig. 10, requisitions for material drawn from stock. Fig. 11, retained in the stock room of the garage, is a continuous inventory which shows at all times what stock is on hand and what and when stock was drawn.

Fig. 6 is retained by the shipping room or sub-station as a record of packages handled.

### Indicate Needed Data

The forms shown on page 21 are not intended as final models, but merely as examples to indicate the matter which should appear on them.

The completed report is now ready for distribution and the Massachusetts institute is anxious to have it reach as many readers as possible. It is surely worth any department store executive's while to spend a few spare hours following these painstaking students in their work and to have the report in his office library ready for reference.

# THE DELIVERY SYSTEM OF R. H. MACY & CO.

By H. F. Thomson, H. L. Manley and A. L. Pashek

REPORT ON AN INVESTIGATION OF DELIVERY SYSTEM METHODS AND OPERATION, AND AN ANALYSIS OF DELIVERY EXPENSES MADE BY THE RESEARCH DIVISION ELECTRICAL ENGINEERING DEPARTMENT, MASSACHUSETTS INSTITUTE OF TECHNOLOGY. BULLETIN NO. 6. SEPTEMBER, 1914

## Introduction

THE delivery system of a large department store is recognized as a very important part of the organization. A delivery system which renders prompt, accurate, and courteous service is essential in retaining the good will of customers. The delivery system is of unusual importance with New York City stores, because the customs of retail trade now demand that practically all purchases be delivered without extra charge. The difficulties in operating a delivery system in the New York territory have increased during recent years with the growth in the number of apartment houses, because the delays in delivering goods at apartments are in general greater than in delivering to other classes of buildings.

The delivery system of R. H. Macy & Co. must contend with other peculiar conditions, one of which is the fact that this company maintains a strictly cash business. On account of the great variety of merchandise sold, the delivery system must be capable of handling packages of all sizes and weights. Furthermore, it is the established policy of this store to deliver purchases promptly, regardless of all obstacles.

The investigation resolved itself into six divisions:

1—A description of the methods of handling and of keeping records of the purchases from the sales clerks to the drivers' bins, that is, an outline of the internal delivery system;

2—A description of the methods now used in handling purchases from the drivers' bins to delivery to purchaser, that is, a description of the external delivery system;

3—A detailed study of the operation of the present external delivery system, with special reference to the different classes of service;

4—An analysis of delivery expenses to determine the present cost of delivery in the different classes of service by the different types of vehicles;

5—Suggestions regarding possible changes in the delivery service with a view toward improvement of service, reduction of expense, or both;

6—Recommendations as to a revision of the methods of recording the performance and expenses of the delivery system.

The study extended over a period from February to July, 1914, during which time the average number of pieces handled per month checked favorably with the average number of pieces per month for each of the two preceding years.

## Outline of Procedure

In order to obtain an understanding of the various methods of handling parcels from the sales clerks to the drivers' bins—internal delivery system—and from the drivers' bins to the customers—external delivery system—considerable time was spent in observing the various operations and in interviewing the employes connected with the several branches of the service. This involved a study of the assembling, wrapping, packing, sorting and recording of purchases, as well as the methods by which parcels are handled and conveyed from the sales counter to the customer. In addition, several series of observations were made upon the number of purchases in the drivers' bins at any time throughout the day. Reports extending over a week were also obtained upon the number of purchases taken out on each delivery and the number returned, for the various classes of service.

The study of the operation of the external delivery system is based upon observations, extending over 3 months, of the actual vehicle performances in the various services. The data on vehicle performance was collected by observers who rode on the wagons and observed all movements of the drivers and vehicles. Card records were collected for each delivery trip during two periods of 1 week each, in order that the average performance of the entire delivery system could be obtained.

The cost records furnished by the company consisted of a summary of its Dissection Book figures for the entire external delivery system for the 6 months ending January 31, 1914, together with a more detailed statement of the cost of operating their motor trucks during this same period. The methods employed in distributing, to the various branches of the delivery service, the lump sum figures of the Dissection Book record is explained in Part II of this report.

In Part III of the report are given certain general suggestions in regard to changes in the external delivery system which would, it is believed, result in an appreciable reduction in the cost of the service. No attempt has been made to estimate the actual saving which might thus be effected, inasmuch as the performance data available did not extend over a long enough period to warrant a close estimate of the possible saving.

In Part IV of the report is outlined a revised method of keeping performance and cost records. This system, if adopted, would make possible a more accurate determination of the cost of each class of service and each type of vehicle, and would also furnish in a period of 6 months the data necessary for an accurate estimate of the saving which would result from the changes suggested in Part III.

## Internal and External Delivery Systems

Although the principal object of this research was the investigation of the company's external delivery system, it was necessary to examine the operation of the internal delivery system, because the efficiency in handling the goods through the various stages of delivery and the cost of performing the entire delivery service depend in many ways upon the methods employed in passing the purchased goods from the sales clerks to the drivers for delivery. The study of the internal and of the external delivery systems included a careful consideration of each of the following points:

1—Internal delivery system:
- General layout of store.
- Layout of delivery rooms.
- Methods of sending purchases to the delivery rooms.
- Classes of purchases.
- Types of sales slips.
- Methods of handling purchases in delivery rooms.
- Records of purchases handled.
- Time study of arrival of purchases in drivers' bins.

2—External delivery system:
- Classes of delivery service.
- Delivery districts; sorting rooms.
- Suburban depots.
- Typical delivery schedule.
- Delivery equipment.
- Procedure of driver in taking out load.
- General procedure of making deliveries.
- Drivers' delivery records.
- Office handling of delivery records.
- Methods of disposing of returned goods.
- Records of deliveries made through depots.

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# PART I
# STUDY OF OPERATING PERFORMANCE

## Methods Employed

The study of the operating performance involved an extended series of observations on the performance of vehicles, as well as upon the movements of the drivers and wagon boys. In order to obtain the data necessary for the study, two methods were used, namely:

1—Observations obtained by riding on the vehicles and recording the movements of the vehicle and delivery men.

2—Card records of delivery performance made up from records of the loads and the times of leaving and arriving at the stable and store.

The observations taken by riding with the vehicles extended over a period of 7 weeks. More than half of all the routes operated were covered in this manner. The observer accompanied the driver while away from the wagon making deliveries, in order to obtain first-hand information upon the manner in which the packages were disposed of. To obtain more extended data than it was possible to collect by observation, card records were kept for each delivery trip from the store and depots during a period of 2 weeks. The card used is shown in Fig. 1. The data on these cards was tabulated and summarized.

Miscellaneous data concerning the delivery service was collected from time to time by actual observation or from daily reports.

## Terms Used in Discussing Data

In discussing these observed and reported data the following terms will be used:

Aggregate Delivery Time, is the sum of the driver's and boy's total delivery time; see below.

Average Delivery Time, is obtained by dividing **the aggregate delivery** time by the total number of deliveries.

Boy's Total Delivery Time, is the total time that the boy **is absent from the wagon** making deliveries.

Boy's Unit Delivery Time, is obtained by dividing the boy's total delivery time by the number of deliveries made by the boy.

Delivery. A delivery is a call at one address to leave or receive goods.

Driver's Total Delivery Time, is the total time on a single trip that the driver **is absent from the wagon** making deliveries.

Driver's Unit Delivery Time, is obtained by dividing the driver's total delivery time by the number of deliveries made by the driver.

Stop. The stop refers to the vehicle stop for the purpose of making deliveries.

## Summary of Observations Upon Delivery Routes

The large amount of data collected by observations during rides on the vehicles was tabulated under the following headings:

Distance: (a) store to delivery zone, (b) over route, (c) delivery zone to store, (d) total.

Speed corresponding to Distances (a), (b), (c) and (d).

Moving time: (a) while in delivery zone, (b) while absent from store.

Standing time of vehicle while in delivery zone.

Average standing time of vehicle per delivery.

Average time to make delivery: (a) driver, (b) first boy, (c) second boy, (d) average for crew.

Number of delivery stops.

Stops per mile of route.

Number of deliveries per stop.

Average time for driver to make (a) C. O. D. delivery, (b) paid delivery, (c) call.

Nature of buildings in delivery zone, that is, apartment house, flat, office building, private house or residence. This data was obtained upon more than half of the total number of routes being operated. Comparison with the data obtained from the card reports showed that in practically every case the conditions during the trip that the vehicle was accompanied by the observer were typical of normal conditions during that season.

## Observed Characteristics of Delivery Service

In Table I are given the more important performance characteristics of the delivery service as determined by averaging the summarized data of observations made while riding with the wagons. Several of these characteristics deserve special comment, as they have an important bearing upon the relative costs of the different services or are of assistance in comparing horses and motors in a given service.

The average running speeds of the different types of wagons are of interest. In the city services, both parcel and bulk, the electric cars travelled only about 20 per cent faster than the horse wagons, whereas in the service to Brooklyn and Jersey City the electric truck traveled about 60 per cent faster than the horses. This difference is due largely to the ability of the motors to maintain a much higher speed than the horse wagons on the runs of several miles to and from the delivery routes. It is the company's practice to use, on the longer runs, the cars which are in the best operating condition. **The motors showed little superiority over horses in point of speed when making house-to-house stops. However, the types of machines now used by the company are superior to the present types of horse wagons in the convenience afforded the driver, for the bodies are lower and the seats are better arranged.** This point is also indicated by the data upon the standing times of the wagons per delivery, for **the times for the motors were less than the times for the horses in 3 of the 4 services in which comparisons could be made.**

The relative times required to make C. O. D. and Paid deliveries are of great interest. The data in Table I for parcel, bulk, and suburban services show that on the average it requires at least 50 per cent longer time to make a C. O. D. than a Paid delivery. It will also be noted that the driver's delivery time and the standing time per delivery are both approximately twice as great for the bulk service as for the parcel service. This difference is due largely to the fact that it is necessary for the delivery man to wait for bulk goods to be unpacked and assembled and for the container to be returned.

The desirability of assigning two boys instead of one to a wagon on a route with very dense deliveries is frequently discussed. The observations upon wagons operating in similar territory and making approximately the same number of deliveries per stop and having one or two boys showed that in general **the two boys did not work to nearly as good advantage as the one boy.**

This is shown by the figures in Table I for the standing times on parcel service; if the driver and two boys each worked as efficiently as the driver and one boy, then the standing time for two boys should be reduced by 1/3, or from 2.5 to 1.7 minute instead of to 2.1 minute, as observed. The driver's time per delivery was 2.7 minutes with one boy, and 3.4 minutes with two boys. This indicates that when two boys are assigned to a wagon the driver does not feel that he must work at as high a pitch as when only one boy is assigned.

It will be noted that the boys' delivery time was greater than the drivers' delivery time in each service, due to the fact that the boys are used to make deliveries at a distance from the route followed by the wagon, as the drivers are expected to do all driving personally. It should also be noted that the company's rules require the drivers to deliver all C. O. D. purchases, although this rule is not strictly enforced.

It may be noted that a study of considerable interest to an individual company may be made from data upon the number of deliveries made and the mileage traveled by the several delivery routes. This data may be reduced to such a unit as deliveries per mile of route, which unit is of value as indicating the density of business in any given district.

## Delivery Performance as Shown by Card Reports

As noted above, card reports were obtained through the office of the **superintendent of deliveries upon the deliveries handled and the times of leaving and returning for each delivery trip from the store and the depots during a 2 weeks' period. Approximately 3,000 reports were included in this tabulation.**

These card reports furnished data upon the number of deliveries and the number of vehicle-days represented by the several services, as well as the ratio of wagon boys to wagons, all of which data were used in the cost analysis explained in Part II. In Table II are shown the relative portions of the time on duty of the drivers—that is, elapsed time between his reporting in the morning and his departure in the evening—spent by him in driving, between stable and store, at the store or depot, and on the route, in the different classes of service. Meal and other unproductive time is included in this distribution wherever such time was spent by the driver.

## Comparison of Observed and Reported Data

A series of comparisons between the data observed by riding on the wagons and those obtained by the card reports were made by means of plots similar to Fig. 2. The plots were drawn to cover the 2 weeks' data for a given trip, that is, morning or afternoon, on one route; the data plotted is time on trip vs. number of pieces in the load. The figures obtained for the trips on which an observer rode on the wagon were indicated on each plot by a cross, whereas the data obtained by the card reports was shown by dots, see Fig. 2. It was found that, in each case the observed point lay within the limits of the reported data, and that, therefore, the observations were made under normal conditions. It is interesting to note that the average line in Fig. 2 would intersect the time axis at a point representing the time required to drive over the route without stopping to make any deliveries.

## Typical Route Diagram

The manner in which a driver covers his route when making deliveries is shown for one typical case by the map given in Fig. 3. This map gives the area covered by a representative city-parcel route; there are plotted the addresses at which deliveries were made on the observed trip, the points at which the wagon stopped, and, by the line connecting these points, the actual course of the wagon. It will be noted that there are many scattered addresses which do not lie on the route of the vehicle. These deliveries are made by the wagon boy who, at times, performs a number of deliveries independent of the wagon. This plot is typical in showing the systematic manner in which the routes are covered by the drivers and the surprisingly small amount of retracing of the wagon's course, in spite of the fact that the drivers have no lists of the addresses at which calls must be made.

## Time Diagrams

The performance of the vehicles, drivers, and boys while making deliveries are shown in tape records of which Fig. 4 shows a typical section. In this figure the movements of the vehicle are indicated by heavy lines and the periods of time during which the delivery men were absent from the wagon are in outline. The delivery periods for the driver are shown above the line of motion of the vehicle, and those for the

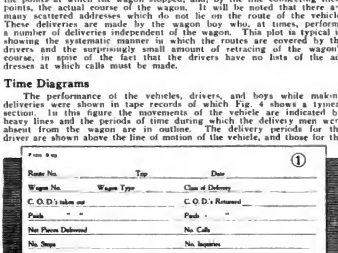


Fig. 1—Form of card used by investigators for recording data of individual delivery trips

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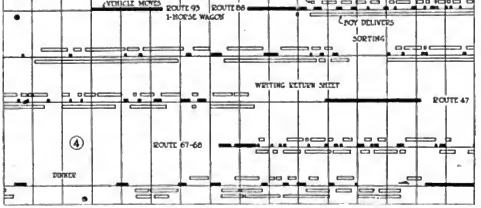


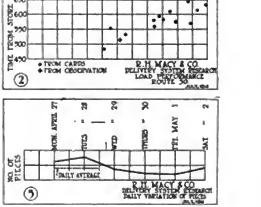


Fig. 4—Above, section of parcel delivery time diagram, showing time spent by vehicle in moving and waiting and by driver and boy in making deliveries. Fig. 2—Upper right corner, load performance, Route 30. Fig. 5—Lower right corner, chart showing daily variation in number of pieces handled in one week

boy or boys are shown below. Besides indicating the relative portions of the time spent in reaching the route and in actual delivery work, these records show that the boys frequently return from a delivery and go off for another while the driver is away from the vehicle. Periods where the boy is away for long intervals are also clearly shown in Fig. 4. The time taken for meals, waiting for the wagon boy, the stops of the vehicle and the periods of standing time on the route, as well as the time moving between the route and the store are clearly indicated.

## Time at Store Necessary to Obtain a Load

A time study was made of the time spent by the drivers at the store in obtaining a load. This time includes:

1—Time to place vehicle for loading.
2—Waiting for route assignment.
3—Checking purchases from driver's bin into roller.
4—Loading and sorting purchases into wagon, and
5—Miscellaneous delays before leaving the store. From the observations made the sum of lost times was seen to be about 15 minutes per trip.

## Daily Variation in Number of Pieces Handled

It has been noticed that there is a considerable variation in the number of pieces handled on the different days of a typical week. In Fig. 5 are plotted the pieces handled through the Delivery Room on each day of the week of April 27, 1914. This plot shows that the greatest number of pieces was handled on Tuesday, April 28, and the smallest number on Friday, May 1; the Tuesday traffic was approximately 17 per cent greater than the Friday traffic.

## Analysis of Driver's Time

The relative amounts of time spent by a city driver on the different pieces of work incident to making deliveries are shown by the following approximate analysis of a wagon driver's time, for one trip, exclusive of the time on route in delivery zone:

Reports at Stable about 7:20 a. m.

| | |
|---|---|
| Harnessing horse to wagon | 5 to 10 min.* |
| Driving from stable to store | 10 to 20 min.* |
| Placing wagon for loading and receiving route assignment | 10 to 20 min. |
| Checking contents of driver's bin | 15 to 30 min. |
| Trucking goods to wagon | 2 to 3 min. |
| Loading wagon and sorting for delivery | 15 to 30 min. |
| Driving from store to first delivery | 2 to 60 min. |
| Driving from last delivery to store | 2 to 60 min. |
| Listing returns and checking collections | 10 to 20 min. |
| Disposing of returns, collections, etc. | 10 to 30 min. |
| Driving from store to stable | 15 to 20 min. |

*This time not to include time of drivers of electric automobiles, as they report directly to store.

## Performance of Vehicles Under Storm Conditions

The motor trucks and horse-drawn vehicles were put to very severe tests by the storm conditions which prevailed during the latter part of February and the early part of March, 1914. Following the fall of 10 inches of snow, the clearing of the sidewalks and car tracks soon made the side streets impassable to vehicles. The main thoroughfares were only passable on the car tracks; hence all deliveries were made on foot, while the vehicle was left on the main street nearest the delivery point. Several of the electric trucks ran out of power and had to be charged at the nearest garage or towed to the store. Broken chains and stripped gears caused some trouble with the gasoline vehicles. On the whole, the performance of the motors was good, though the horse-drawn vehicles managed to get through in some places where motors would have failed.

In the suburbs conditions were much worse and deliveries were delayed for hours. In many cases it was necessary to hire a relay team to relieve the regular team. At the Woodlawn depot the motors were run as far as possible on their routes and the loads were than transferred to horse wagons or sleighs to reach the more difficult points. The trucks were finally taken out of service and the deliveries made by horses and sleighs. At the other depots conditions were equally bad, though the horses were able to do creditable work when hitched to sleighs. In many cases the drivers were obliged to carry parcels through drifts for a considerable distance.

Several of the large New York stores whose service depended entirely upon motor vehicles were obliged to suspend their suburban deliveries entirely until the roads became better. R. H. Macy & Co. managed to maintain regular deliveries, though in some cases several hours late, and

## Table I—Characteristics of Delivery Service as Shown by Observations

| Service | Parcel | Bulk | Parcel and Bulk | | General* Suburban Depots |
|---|---|---|---|---|---|
| District | Below 155th St. | Below 155th St. | Bronx | Brooklyn and Jersey City | |
| Distance from store, miles | 0 to 6 | 0 to 6 | 5 to 9 | 2 to 12 | 6 to 35 |
| Speed, miles per hour | | | | | |
| Horse wagon | 5.6 | 6.0 | ... | 4.8 | 5.6 |
| Electric truck | 6.7 | 7.5 | 6.9 | 7.7 | ... |
| Gasoline truck | ... | ... | ... | ... | 9.8 |
| Driver's delivery time | | | | | |
| Min. per delivery | | | | | |
| C. O. D. | 3.6 | 6.9 | (a) | (a) | 3.5 |
| Paid | 2.4 | 5.4 | (a) | (a) | 1.5 |
| Call | 3.8 | (a) | (a) | (a) | (a) |
| Average | 3.1 | 6.2 | 2.3 | 2.8 | 2.8 |
| Boy's delivery time | | | | | |
| Min. per delivery | | | | | |
| 1 boy on wagon | 5.4 (horse) | 8.1 | 4.2 | 5.1 | 4.7 |
| 2 boys on wagon | 6.6 (elec.) | ... | ... | ... | ... |
| Standing time of wagon | | | | | |
| Min. per delivery | | | | | |
| Horse wagon | 2.5 | 7.0 | ... | 2.9 | 3.1 |
| Electric truck | 2.3 (2 boys) | 5.0 | 2.5 | 2.7 | ... |
| Gasoline truck | ... | ... | ... | ... | 3.3 |
| Deliveries per mile, range | 8 to 53 | 2 to 11 | 9 to 37 | 4 to 13 | 1 to 8 |

(a) Value not determined. * Parcel, bulk and furniture.

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in many instances their wagons were the first to break the trail. After the roads had become somewhat clearer of snow but were still icy, the motor trucks at Woodlawn were able to out-distance the horses, which had great difficulty in retaining their footing.

Taking everything into consideration, it would seem that the horse and sleigh is a very valuable asset for work in the emergencies of a very heavy snowfall. Such a blizzard as experienced in February and March, 1914, is an unusual occurrence; in considering the performance of the delivery wagons at that time, allowance should be made for the very extraordinary conditions which existed.

# PART II
## ANALYSIS OF DELIVERY EXPENSES

To make a complete analysis of the cost of delivery it would be desirable to determine the cost of delivery per piece—by piece is meant a single handle—for 1, any district, city or suburban; 2, any class of goods, parcel, bulk or furniture, and 3, by any type of vehicle, horse, electric or gasoline. Such a complete analysis of the Macy service was not possible without more elaborate data than could be gathered during the time available. This arises from the fact that only below One Hundred Fifty-fifth street are different vehicles assigned solely to any one of the three classes of goods, namely, parcel, bulk and furniture. In the suburban districts a single wagon is generally used for all three classes of goods. In the intermediate district one set of wagons handles both parcel and bulk, and only furniture is separately handled.

In the following analysis the classes of service considered are:

A—Parcel, below One Hundred Fifty-fifth street.

B—Parcel and Bulk, One Hundred Fifty-fifth street to King's Bridge and Fordham Road; Brooklyn and Jersey City.

C—Bulk, below One Hundred Fifty-fifth street.

D—Furniture, covering same territory as A, B, and C.

E—Suburban, combined parcel, bulk and furniture.

F—Factory, between store and factory.

G—Shipping, between store and railroad yards and piers.

H—Milk, special service.

There was obtained by means of the analysis described below:

1—The cost per day of each type of vehicle now used in each of these classes of service, and

2—The delivery cost per piece by each type of vehicle now used in each of the first five of these classes of service. It is obviously impossible to present all of the detailed figures used in making this analysis, as some of the data was of a confidential nature and would be of no general interest. The method of making the analysis will, however, be outlined briefly and the results indicated.

### Data on Which Analysis Is Based

The data available for this analysis is the following, which is more fully described below:

1—Expenses as given in the summary of Dissection Book figures for the 6 months ending January 31, 1914. The Dissection Book comprises semi-annual summaries of service expenses, including Delivery, Packing, Power, etc. These expenses are apportioned to the various sales departments. The figures for delivery expense from this book were grouped under the following general items:

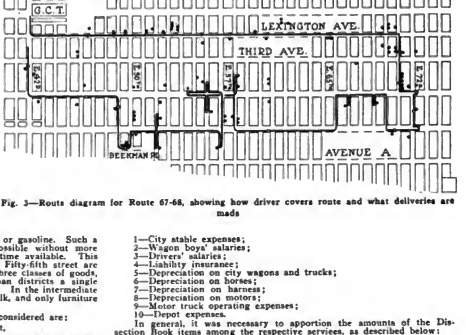


Fig. 3—Route diagram for Route 67-68, showing how driver covers route and what deliveries are made

1—City stable expenses;
2—Wagon boys' salaries;
3—Drivers' salaries;
4—Liability insurance;
5—Depreciation on city wagons and trucks;
6—Depreciation on horses;
7—Depreciation on harness;
8—Depreciation on motors;
9—Motor truck operating expenses;
10—Depot expenses.

In general, it was necessary to apportion the amounts of the Dissection Book items among the respective services, as described below:

II—Expenses and mileages for the different types of motor vehicles as given in the Automobile Log Book for the same period. The mileages given in this book are daily estimates by the drivers, as in general odometers are not used. The only apportionment of amounts made upon a mileage basis was in the case of certain of the charges between furniture and transfer service for which no other basis of apportionment was available.

III—Company's records of vehicle-days in the several services, the vehicle-days of all classes of motor vehicles being lumped; the total number of horses available during the 6 months' period; the weekly wages of drivers and wagon boys; the estimated daily mileages of the transfer trucks serving the various depots, and estimated mileages of the several routes from each depot, supplied by the depot managers.

IV—Records furnished by the company of the details of the performance of the several types of vehicles in the several services for two 1-week periods, during the period of this study, namely, the card reports described above. The data used was:

1—Vehicle-days served by horse, electric, and gasoline vehicles, respectively, upon parcel, bulk, furniture and combined parcel-and-bulk services;

2—Average number of wagon boys or helpers per wagon for the various services;

3—The number of pieces handled by the various classes of delivery equipment, namely, parcel pieces by wagons and electric cars, parcel-and-bulk pieces by wagons, electric cars, and gasoline cars; furniture pieces by horse and motor trucks; and bulk pieces by single and double horse trucks, and electric trucks.

V—Records of pieces, single bundles, handled through the various sorting rooms as taken from the company's books for the 6 months

(Continued on page 20)

## Table II—Distribution of Drivers' Time on Duty

| Service | Per Cent of Time: Moving between stable and store | At store or depot | On route | Total |
|---|---|---|---|---|
| **Parcel** | | | | |
| Horse | 8 | 26 | 66 | 100 |
| Electric | .. | 21 | 79 | 100 |
| **Parcel and Bulk** | | | | |
| Brooklyn and Jersey City, horse | 5 | 17 | 78 | 100 |
| Brooklyn and Jersey City, electric | .. | 13 | 87 | 100 |
| Bronx, electric | .. | 13 | 87 | 100 |
| **Bulk** | | | | |
| Horse | 8 | 28 | 64 | 100 |
| Electric | .. | 28 | 72 | 100 |
| Furniture trucking, horse | 11 | 13 | 76 | 100 |
| Shipping truck, horse | 6 | 16 | 78 | 100 |
| **Depot** | | | | |
| Woodlawn, gasoline | .. | 17 | 83 | 100 |
| Newark, horse | .. | 11 | 89 | 100 |
| Hackensack, horse | .. | 14 | 86 | 100 |
| Staten Island, horse | .. | 16 | 84 | 100 |
| Flushing, horse | .. | 18 | 82 | 100 |
| Far Rockaway, horse | .. | 24 | 76 | 100 |
| Sea Bright, horse | .. | 33 | 67 | 100 |

## Table III—Cost per Vehicle-day

| Service | Cost per day used: From the store | From the depot |
|---|---|---|
| **Parcel** | | |
| Horse | $8.56 | ..... |
| Electric | 9.33 | ..... |
| **Parcel and Bulk** | | |
| Horse | 8.94 | ..... |
| Electric | 9.48 | ..... |
| Gasoline | 12.87 | ..... |
| **Bulk** | | |
| Single horse wagon | 8.45 | ..... |
| Double horse wagon | 12.90 | ..... |
| Electric truck | 9.03 | ..... |
| **Furniture** | | |
| Horse wagon | 14.66 | ..... |
| Gasoline truck | 0.495 per mile | ..... |
| Factory* | 10.73 | ..... |
| Shipping† | 11.14 | ..... |
| **Depots** | | |
| Woodlawn (gasoline) | 15.00 | 12.40 |
| Hackensack (horse) | 12.90 | 10.90 |
| Newark (horse) | 12.98 | 11.20 |
| Staten Island (horse) | 9.85 | 9.50 |
| Sea Bright (horse) | 15.92 | 12.40 |
| Flushing (horse) | 14.55 | 11.20 |
| Far Rockaway (horse) | 13.86 | 8.20 |

* Trucking between store and company's outside workshops.
† Trucking between store and freight docks and terminals.

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## The Two-speed Electric

ONE of the favorite talking points for the electric vehicle is its simplicity of control, its absence of clutch and change-gear lever. While this is unquestionably a very good talking point and while it is no less a real advantage, much to be desired, too much of a fetish need not be made of the absence of the change-gear lever.

Two-speed electrics have been made and their performance has justified the additional cost of such construction and the increased complication of the control. There is no more reason for the electric being entirely a high-gear vehicle than there is for the gasoline vehicle. Gasoline cars have repeatedly been used for high-gear runs and the modern buyer of a gasoline passenger car demands that the car be able to negotiate practically all sorts of ordinary going in high gear. This has not been taken as a token of the uselessness of the three-speed gearbox. Indeed, there are many who insist on four speeds and even more.

The draft on the battery of an electric truck depends upon the load taken by the motor. When the load is light the draft is light and an electric truck will be able to make its normal 35 to 45 miles per charge. But if the roads are hilly, if the pavements are rough or soft, not nearly as much mileage can be gotten out of the charge. It is a common occurrence every winter in our northern cities to have electrics all over town paralyzed through exhausted batteries even before noontime.

Some authorities state that if the load on the motor is doubled the draft on the battery is cubed. Merely because the electric motor will keep on pulling when severely overloaded is no indication that it will continue to do so for long. Serious damage to the windings may result from overloads of this nature, or if not to the motor, to the battery.

If a battery's exhaustion of energy increases so disproportionately with the increase in load, then it seems logical that if a secondary gear could be employed which would permit the motor to run faster under a lightened torque when difficult going is encountered, the same work could be done with a gratifying economy of current. The additional complication would be slight, as we have already seen in vehicles which are so equipped, and a simple interlocking connection with the controller might be arranged to prevent gear-changes except with the power off.

Not long ago a large baking concern in the northwest desired to replace its horses with electric trucks. Several makes were demonstrated, but owing to the severe snowstorms encountered in that region, the company became convinced that something more flexible in this regard was needed. The final outcome of it was that a consulting engineer was called in to design a special vehicle for these conditions, the regular makers refusing to alter their designs as required by the bakery. The concern built its own vehicles and they were equipped with two-speed gearboxes.

## Freight Congestion

THE President in his message has called attention to the present appalling condition of congestion at our freight terminals. Perhaps Mr. Wilson has seen the handwriting on the wall if the railroads have not. The test of a boiler is to subject it to a pressure much in excess of that to which it is ever likely to be subjected in normal service. Similarly the test of a transportation scheme is its ability to stand up and give efficient service under extraordinary stress.

This the railroads have failed to do. Not only have export shipments been delayed, but the hopeless tangle in the yards back of our eastern ports has had its reflex effect upon domestic freight traffic.

For years shippers and receivers of freight have suffered patiently the hardships imposed by the antiquated and inadequate freight terminal facilities in this country, half a century behind those of the great European countries, notably Germany.

Repeated attempts at relief of the congestion by the employment of motor trucks to haul the freight to and from the terminals have met with uniform failure because the carriers have repeatedly failed to co-operate to the extent of keeping their receiving platforms clear and giving tailboard delivery of freight to vehicles.

The railroads have demonstrated their inability to cope with emergency conditions. They are manifestly in no condition to render efficient aid to an army in case of war. They are admittedly unable to handle short-haul traffic efficiently or even with a profit for themselves.

The motor truck will play a bigger part in the

(Continued on page 25)

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# HE OBSERVES AND APPLIES

OBSERVATION, study, application and organization are the four outsanding characteristics of Thomas H. Roulston which have enabled him to suit his vehicular equipment to the peculiar conditions of his own business. It used to take 2 hours to load his vehicles. Now it takes 5 minutes. Roulston is the president of the Thomas Roulston company, a large retail grocery concern in Brooklyn, N. Y., with a chain of about 200 stores scattered over Brooklyn and Long Island at points within a 60-mile radius from the plant.

He came to the United States from Ireland when 6 years old. He opened his first grocery store in 1897, 18 years ago. Since then, by persistent hard work, he has added store upon store until at the present time he has one of the largest chains of grocery stores in the country.

As the number of his stores increased from year to year, the problem of delivering the goods from his plant to the various stores became one of more and more importance. While originally all of the Roulston stores were located within the limits of the Borough of Brooklyn, he sought to get increased trade by opening stores beyond these confines. Each time he opened stores farther away from his plant, which, of course, made his delivery routes more complicated.

At first he used horses exclusively. Then, as he added store and store to his chain, it became more and more difficult to serve them properly with horses because they were farther and farther away from his base of supplies. Again, competition became keener and keener and the margin of profit smaller and smaller, so that to keep apace with his competitors he had to introduce economies in his delivery system.

This was not any easy thing to do, for a horse is a horse and capable of just about so much work a day. If you drive it extra hard 1 day and accomplish more than the usual amount of work, it will do less than the average amount on the day following, so that the average work done per day remains fairly constant.

Roulston knew the tonnage delivered by his horse wagons from the warehouse to the various stores, but he did not know the average mileage per day per team. In order to find out just how many miles his horse wagons averaged a day, he installed recording devices of the tape type on a large number of his wagons in 1911. These were used for about 10 months, including both winter and summer months. Roulston found that his wagons covered an average of 70 miles per week or about 11 miles per day.

Eleven miles per day is a very low average, even for a horse vehicle, but when it is considered that it took from 1 to 1½ hours to load a wagon with miscellaneous goods, such as sugar, butter, eggs, coffee, etc., all in different forms of containers, Roulston observed that the fault was not so much with the horses as it was with the loading.

He went to several other of the grocery concerns in the Metropolitan area and observed how each loaded its wagons. All were doing it in the same manner, by backing the wagon up to a platform and putting the load on piece by piece. Roulston observed that this wasted a large proportion of the possible working time of the vehicles. He also found the platforms far too small, thus making many vehicles waste time in waiting to be loaded. He decided then and there that when he built his new plant to take care of his increased business, that he would put his observations into practical effect by building a loading platform large enough to enable a large percentage, if not all, of his wagons to be loaded at the same time.

With this end in view he spent $30,000 in the erection of a storehouse so designed that it could be utilized as a loading areaway and platform when the new storehouse which he contemplated putting up next to it were erected. Thus Roulston built his loading platform before his building. He had made use of one-half of his observations. His wagons would not waste time waiting to be loaded. The other half, the necessity of reducing the idle actual loading time, he saw no way to solve at that time.

His new warehouse was completed in 1914. The smaller warehouse next it was made over into a loading platform, the roof remaining to shelter the platform. The latter was built along one side of the new building, the goods being transferred from building to platform through doors in the adjacent wall. The remainder of the area of the old warehouse was used as a wide runway to the platform which gave plenty of room for each vehicle to get in, back up to the platform and get out without interfering with the others. It was not long after he had applied the results of his first observation to his own plant that he decided that motor trucks would enable him to reach out farther and get more business because of their great

(Continued on page 31)

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# Explosions Traced to Chamois Funnels

## Rubber Fuel Hose Also Causes Static Electric Spark

BOSTON, MASS., Dec. 3—Close investigation of the fire that occurred in the garage of the Boston Elevated Railway Co.'s garage last week, destroying seven cars and burning the building somewhat, entailing a loss of about $25,000, adds another instance to those already discovered where explosions have been caused by static or frictional electricity when filling a car. The chauffeur had poured 10 gallons of gasoline into the tank and was about to pour in some more when a spark ignited the vapor. He was using a chamois strainer and funnel.

Some time ago, Walter Wedger, chemist for the detective and fire prevention department of the Massachusetts State Police, began an investigation of fires caused from no apparant reason. He interviewed the chauffeur of the car that caught fire in the garage of the Metropolitan Park Commission in Cambridge. The latter stated positively that he had heard a spark while filling the tank, using a funnel that set in a wooden ring. The ring was used to overcome the difficulty of a wobbly funnel. After pouring some gasoline through the chamois skin, the man brought the pouring can near the metal edge of the funnel and the spark followed, causing the explosion and fire.

Mr. Wedger then set about to duplicate similar conditions. He got a number of prominent men to watch the experiments. Gasoline was poured through a chamois skin covered funnel insulated from the floor of the garage, and a spark obtained. Several experiments were tried and a gold leaf electroscope, which was used to locate a charge of static electricity, showed that it existed in a considerable quantity. The funnel, which was painted on the outwise, was placed in the tank of the car without the wooden block and the experiment repeated. The size of the charge was considerably lessened when the paint was removed from the funnel so that the funnel made a good contact with the metal of the tank.

Various other tests proved that gasoline poured through a non-conductor of electricity did generate frictional electricity, and as the chamois skin was such a non-conductor, electric conditions of a dangerous character were generated by pouring gasoline through the chamois.

If the non-conductor is in contact with the ground or a large metallic body, the amount of static electricity generated will be absorbed and does not make its presence known. However, if the non-conductor is in contact with only a small amount of metal, as a funnel or a faucet, this metal becomes highly charged with electricity and will discharge a good-sized spark if another metallic substance is brought in contact with it or very close to it. Consequently in this fire the funnel, being insulated by the wooden block, became charged, and when the metal pouring can was brought near it, it discharged with a spark of sufficient intensity to ignite gasoline vapor.

As a result of those experiments the officers of the state police began investigating other fires. They located a chauffeur who was pouring gasoline into a car at a private garage in Brookline who had two fires. He had hung the 5-gallon can by the bail on a hook of a self-measuring pump, the bail having a wooden handle which insulated it from the metal of the pump. While drawing gasoline a spark ignited the vapor and he threw can and all outdoors. When he tried again with similar results he refused to use the pump any more.

Another chauffeur in the same town was using a 16-foot rubber hose with a metallic shut-off. A spark half an inch long shot from the nozzle to the tank, starting a fire. In Cambridge there was another fire under like circumstances that led the Henderson brothers, who built trucks and wagons, to make an investigation, for two of their relatives were nearly cremated as a result of a garage fire. The police learned that at Albany several fires occurred at an oil station caused by frictional electricity in a canvas spout used to convey gasoline to tank cars. The canvas had a coat of shellac and hung from an overhead pipe, the lower end reaching to the hole of the tank car, but not touching the metal. Tests showed that the friction of the gasoline passing through the canvas and rubbing against the shellac coating caused the generation of between 400 and 500 volts of electricity.

### ESTIMATED TRUCK OUTPUT 45,000

NEW YORK CITY, Dec. 4—The 1915 output of American truck manufacturers has been estimated at 45,000 by the National Automobile Chamber of Commerce, Inc., New York City. This figure is based on the N. A. C. C. report of 28,000 trucks made by its members in the 12 months ending last June. The N. A. C. C. truck members are estimated to make about three-fourths of the trucks made in this country, so that the figure of 45,000 may be considered a fairly good estimation. Less than half this number were shipped abroad.

### 1-WEEK TRUCK EXPORTS $1,479,000

NEW YORK CITY, Dec. 6—Motor trucks to the value of $1,479,000 were exported from this port in the week ending November 20. Motor vehicle parts and tires exported during the same week were valued at $574,000.

### Coming Commercial Vehicle Events

Dec. 16.....New York City, Met. Sec. S. A. E. Meeting, Automobile Club of America.

1916

Jan. 5-6.....New York City, S. A. E. Winter Sessions, Standards Committee Meetings.

Jan. 8-15.....Cleveland, O., Show, Wigmore Coliseum.

Jan. 8-15.....Philadelphia, Pa., Show.

Jan. 18.....Newark, N. J., Monthly Meeting, Motor Truck Club of New Jersey, Automobile Club, 22 Washington place.

Jan. 19.....New York City, Monthly Meeting, Motor Truck Club of America, Automobile Club of America.

Jan. 29-Feb. 5...Columbus, O., Motor Vehicle Show.

Jan. 29-Feb. 5...Minneapolis, Minn., Motor Vehicle Show.

March 4-11.....Boston, Mass., Motor Vehicle Show, Mechanics' Hall.

# Bay State Truck Gain 50% per Year

## Number in 1915 11,960—Gain in 3 Years 7,873

BOSTON, MASS., Dec. 11—The Massachusetts Highway Commission figures for 1915 on the registration of vehicles are practically compiled for the fiscal year ending on November 30, and it gives some idea of the big gain in commercial vehicles in the Bay State. There will be a few more registered in the few weeks remaining of this year, but not enough to make much difference.

Massachusetts began to register motor trucks as distinct from passenger cars in 1912, so that figures for the 4 years may be used to show the comparative increase annually. In 1912 there were 4,087 trucks listed. The following year the figures had jumped to 5,948, a gain of 1,861, or very nearly 50 per cent. In 1914 there were 8,236, or a jump of 2,288, or more than 40 per cent. It was just twice as many as had been registered the first year with 62 to spare.

This year the figures show 11,960 commercial vehicles listed. This is an increase of 3,724 over the preceding year. It is interesting to note that as 1914 doubled 1912 with 62 to spare, so this year has also doubled the corresponding year, that of 1913, and it has 104 additional. If this percentage should keep up and 1916 double 1914 it would give something like 16,500 commercial vehicles in the Bay State next year, or an increase of approximately 4,500. This does not seem improbable by a further study of the figures, for last year showed such a big gain that it is evidence that the business men have awakened to a realization of the fact that trucks are the real means of transportation.

One fact that held up sales a year ago was the agitation over legislation. This year there was no talk of increasing the fees and so business houses were not afraid to buy. With the talk made now about increases, and such radical ones, too, on the part of legislators and commissions, it may lead to a falling off in sales next year unless the tide is stemmed. The motor bodies will attempt to do this. The following figures give a more detailed comparison of the growth of motor trucks in the Bay State:

| Year | Number | Gain | 2-year gain | 3-year gain |
|---|---|---|---|---|
| 1912 | 4,087 | | | |
| 1913 | 5,948 | 1,861 | | |
| 1914 | 8,236 | 2,288 | 4,149 | |
| 1915 | 11,960 | 3,724 | 6,052 | 7,873 |

### 22,949 TRUCKS IN N. Y. STATE

ALBANY, N. Y., Dec. 8—There were 22,949 motor trucks registered in the State of New York during 1915 up to December 4, according to figures just made public by Secretary of State Hugo. At the same time in 1914, 17,037 trucks were registered. This shows a gain for 1915 of 5,912 trucks, an increase of approximately 29 per cent.

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# Exports Delayed by Freight Tie-up

## 65,000 Loaded Cars Await Unloading Near Metropolis

NEW YORK CITY, Dec. 7—Congestion of freight at New York and other Atlantic ports is greater than ever before and is causing great concern to the traffic managers of the Detroit motor truck and passenger car manufacturers because they can not get sufficient cars to ship their products from the factories. This is due to a lack of empty freight cars, while this in turn is due to the large number of loaded cars held in and around New York because of a lack of ships to carry the goods abroad.

The Packard Motor Car Co., Detroit, has been one of those hardest hit by the lack of cars. Its traffic manager, C. J. Shaar, is using his utmost efforts to get railroad equipment to handle the Packard product. According to him, there are close to 65,000 loaded freight cars tied up at the present time in or near New York City.

### COMMERCE GAINS 150 PER CENT

DETROIT, Dec. 4—The business of the Commerce Motor Car Co., this city, maker of the 1,500-pound Commerce truck, was 150 per cent larger in 1915 than in 1914, according to an announcement made by the officers of the company at a meeting of the board of directors held here this week.

At the directors meeting it was also decided to increase the capital stock of the Commerce company from $100,000 to $200,000. A meeting of the stockholders of the company is to be held on December 14 to decide whether a stock dividend of 50 per cent, as recommended by the directors, be paid to stockholders of record, December 15.

The earnings of the company are expected to be close to $70,000, or 70 per cent of the former capital stock. It is not likely that cash dividends will be paid for some time, but it is possible that another stock dividend of 33⅓ per cent will be paid early next year.

### DENBY STOCK INCREASE $250,000

DETROIT, Dec. 4—The Denby Motor Truck Co., this city, has decided to increase its capital stock from $500,000 to $750,000, of which $500,000 will be common and the balance preferred. The present stock is all common. None of the new stock is to be placed on the market. It is said that the greater part of the new stock has already been subscribed for by the present stockholders.

The Denby company started in business in July, 1914 and its business has been gradually increasing until now it has become necessary to increase the capital stock to provide greater production facilities.

### NEW FOUR-WHEEL-DRIVEN TRUCK

BEECH CREEK, PA., Dec. 3—A new four-wheel-driven, four-wheel-steered truck is to be manufactured by the Beech Creek Truck & Auto Co., of this city, the first model of which was recently tried out here. The feature of the new truck is that both front and rear axles are pivoted to the frame at their center points by means of large ball-and-socket joints. These permit the entire axles to turn when rounding a corner, allowing the wheels to give a straight pull on the axle, no matter whether driving straight ahead of on the most extreme turns.

This device is somewhat similar to that used on the Hoadley truck, made by the Hoadley Motor Truck Co., Gosport, Ind., except that in the latter case the axles are carried on conventional fifth-wheels.

### NEW WEIER-SMITH TRUCK

DETROIT, Dec. 10—A new model of a 1½-ton four-wheel-driven truck will soon be brought out by the Weier-Smith Truck Co., Birmingham, Mich. The company was formed in 1914. It has just increased its capital stock from $30,000 to $50,000.

### MYERS TO MAKE WISCONSIN TRUCK

SHEBOYGAN, WIS., Dec. 4—The Myers Machine Co., of this city, has been reincorporated to include the plant and business of the Wisconsin Motor Truck Co., Barbaboo, Wis. The Myers company will manufacture the line of Wisconsin trucks, which will consist of 1,500-pound, 1-ton and 2-ton worm-driven models. A contract has been awarded for the erection of a shop addition, 75 by 75 feet, at the Myers plant, to accommodate the truck-making department.

### NEW VELIE 1,200-POUNDER

MOLINE, ILL., Dec. 10—A 1,200-pound truck is to be added to the line of heavier Velie trucks, made by the Velie Motor Vehicle Co., Inc., of this city. It will be ready some time in the coming spring. Details of the new model cannot be announced as yet.

### NEW STANDARD 2-TONNER

DETROIT, Dec. 4—A new 2-ton worm-driven truck has just been placed on the market by the Standard Motor Truck Co., of this city, which heretofore confined itself to the manufacture of 3½-, 4- and 5-ton models. Advance detailed specifications of the new model were published in THE COMMERCIAL VEHICLE of October 15, 1915.

### MISCAMPBELL, NEW TRUCK

DULUTH, MINN., Dec. 4—A new 2½-ton motor truck, to sell at $2,700, is to be made by Hugh Miscampbell, who has a machine shop in this city, it is reported. Details of the proposed truck are not yet available, although it is said that all parts, except the motor, a Continental, will be made in the Miscampbell shops.

### IOWA A NEW TRUCK

OTTUMWA, IA., Dec. 4—The Iowa Motor Truck Co. was recently formed in this city for the manufacture of 1- and 1½-ton trucks of the internal-gear-driven type. The truck will be known as the Iowa and will be sold in the middle west.

### NEW CANADIAN TRUCK

HAMILTON, ONT., Dec. 3—The National Steel Car Co., Ltd., is now manufacturing a line of motor trucks comprising 1-ton, 2-ton and 3½-ton capacities.

# More Killed by Street Cars Than Motors

## Massachusetts Figures Show Vehicles to Be Safer

NEW YORK CITY, Dec. 4—Nearly twice as many persons were killed or injured in street railway accidents in Massachusetts during the year 1914 as in motor vehicle accidents, observes the Massachusetts highway commissioner in his report for that year, recently issued.

"Any computation made," he states, "on assuming an ordinary mileage for automobiles and taking the actual mileage of the street railways, will show that the motor vehicle runs several times as many miles as the street car does before it either kills or injures anyone."

Considering only accidents to persons who were not passengers, 10,000 street cars killed or injured 1,491 persons, and about 100,000 trucks and passenger cars killed or injured 3,304. Some person was either killed or injured for every 16,000 miles that a street car was operated, and one person for every 110,000 miles a motor vehicle was operated, assuming that the motor traveled an average of 5,000 miles in the year.

"In accident cases it often happens," the commissioner observes, "that the pedestrian, the bicycle rider or the driver of a carriage is careless or reckless and to blame, rather than the operator of the motor car. It is certainly deplorable that so many accidents occur, but it must be borne in mind that some accidents are unavoidable, no matter how careful the operators of motor cars may be."

The figures given and observations made confirm those of the coroner of Cook county for street accidents in Chicago, those of the New York Police Department and the accident reports of the Boston Police Department, which show that only a small minority of accidents are due to the fault of motor vehicle operators and that the ratio of accidents per mile traveled is much smaller for motor trucks or cars than for street cars and horse-drawn vehicles.

### REPUBLIC INTERNAL-GEAR-DRIVEN 5-TONNER

DETROIT, Dec. 10—A 5-ton internal-gear-driven truck is to be brought out by the Republic Motor Truck Co., Alma, Mich. Details of the new model have not yet been announced, but will be published in THE COMMERCIAL VEHICLE as soon as available.

### NEW TROY TRAILER

DETROIT, Dec. 10—A new four-wheeled trailer of 1,250 pounds capacity to sell at $125, has just been brought out by the Troy Wagon Wks. Co., Troy, O. This is the lightest Troy trailer made. It has a 70-inch wheelbase, standard 56-inch track and is mounted on solid tires. A complete description of the vehicle appears on page 31 of this issue.

### BREWERS DON'T BUILD TRUCKS

MILWAUKEE, WIS., Dec. 7—The American Brewers' & Bottlers' Specialty Co., of this city, have not entered the truck manufacturing field, as stated in THE COMMERCIAL VEHICLE of November 15, 1915, but only make motor vehicle parts, such as gasoline tanks, fenders, hoods and radiators, etc.

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SOUTH BEND, IND., Dec. 9—George Cumerford and John Lingard, both of Laporte, have completed the model of gas tractor which they have patented and expect to have on the market for spring trade. The tractor will be manufactured in Chicago by the W. A. Jones Foundry company. It is claimed it has done work on the Kankakee marsh that other machines failed to do. It is light and powerful and will sell for about $800 or $850. Its wheelbase is 102 inches; 10½ feet long over all, and weighs 3,400 pounds. It is equipped with the Buda motor of 45 horsepower.

### GOODYEAR EARNS 5½ PER CENT

AKRON, O., Dec. 7—An earning of 5½ per cent on the common stock of the Goodyear Tire & Rubber Co. was shown in the annual report of the Goodyear company for the year ending October 31, after all charges had been deducted. The company's sales were $36,490,652, against $31,056,128 in 1914. The net income was $3,137,082. The current assets are $14,500,000 and the current liabilities $1,944,000.

### KELLY-SPRINGFIELD TIRE STOCK PAR VALUE $25

NEW YORK CITY, Dec. 2—The par value of the common stock of the Kelly-Springfield Tire Co. was reduced from $100 to $25 at a special meeting of the stockholders held last week in Jersey City, N. J. Common stockholders were also given the voting privilege of one vote for each $25 worth of stock, and the preferred stockholders four votes for each share of stock, par value $100.

### BROWN-LIPE GETS MEDAL

SAN FRANCISCO, CAL., Dec. 8—A gold medal was awarded to the Brown-Lipe-Chapin Co., and the Brown-Lipe Gear Co., Syracuse, N. Y. by the Panama-Pacific International Exposition Jury of Awards for exhibits of gearsets, differentials and gears.

### DECEMBER JEFFERY QUAD MONTH

KENOSHA, WIS., Dec. 4—The month of December has been set aside by the Thomas B. Jeffery Co., of this city, as Quad month, in which demonstrations of the Jeffery four-wheel-driven and four-wheeled-steered truck will be made in all parts of the country. December was selected due to the general poor conditions of roads in that month and due to the fact that the advantages of the four-wheel-driven vehicle can be best brought out when the roads are muddy or slippery.

### KNOX SETTLES STRIKE

SPRINGFIELD, MASS., Dec. 7—The machinists' strike at the plant of the Knox Motors Co., this city, has been settled to the satisfaction of both the men and the Knox company. The strike lasted but a few days.

### TRUMBULL IN RECEIVERSHIP

BRIDGEPORT, CONN., Dec. 3—The Trumbull Motor Co. went into the hands of a receiver last Friday. Judge E. K. Nicholson was chosen to take charge of the company's affairs. He was empowered to carry on the business until December 10. A hearing will be held today for the appointment and confirmation of the receiver and for the naming of appraisers.

The company was formed about 2 years ago to make a small chassis for passenger or parcel work. The capital stock is $300,000, of which $170,000 has been paid in. The liabilities are not stated. The assets are fixed at $150,000. The petition to the court was made at the instance of A. H. Trumbull, president; F. S. Trumbull, vice president, and James Trumbull and R. B. Adams, stockholders. The petition states that the stockholders recently voted to discontinue the business.

# Club Gives Truck Ferry Rate Facts

## Shows Why Increased Truck Fees Would Be Unfair

NEW YORK CITY, Dec. 2—A strong case against the increase of motor truck ferry rates by the Erie Railroad Co. was presented in the brief prepared by C. G. Bond, of the firm of Coulter & Bond, counsel for the Motor Truck Club of America, that was argued before the Interstate Commerce Commission in November.

The brief, short and concise, first gives a statement of the case. It then points out that the ferry is a part of the railroad and that the profit now earned by the ferries is a reasonable one and is showing an increase each year. It further states that rates on vehicular traffic should not be increased as the increase in ferry operation expense due to a better class of boats being used is due to passenger, not vehicular traffic.

It then argues that the proposed rates are excessive and that even though an increase were allowed there should be no increase in motor truck rates. This is based on the fact that at the hearing held before the commission in New York City last summer, members of the railroad company admitted that with horse vehicles the horses took up 46 per cent of the space of both wagon and animals and that the horses did not have to pay for the space they occupied, because the present rates are based on the length of the vehicle. Motor trucks, on the other hand, pay for the full length which they occupy, so that if any rates are to be increased they should be those for horse vehicles and not motor trucks.

It was also brought out at the hearing last summer that the deck sheathing of the ferries had to be replaced more often and that winches had to be employed to get the heavy vehicles up the ferry slip runway. Counsel Bond pointed out that the extra wear on the deck sheathing was due to the horses' hoofs digging into it and that the rubber tires of motor trucks were not responsible. He also pointed out that the winches were used for the horse vehicles and not for the motor trucks.

FT. WAYNE, IND., Dec. 9—Under the direction of John Leach, a plan has been evolved at the plant of the S. F. Bowser Oil Tank & Pump Wks., Fort Wayne, under which the factory employes only, about $50 in number, will obtain a part of the profits of the company. The first step was the reduction of the shop hours from 9 to 8½, with no decrease in wages. The men are to receive their share of the dividend monthly.

### BOSTON ELECTRICS PARADE

BOSTON, MASS., Dec. 2—A parade of electric trucks was part of the big electric prosperity week celebration here this week. Chief Marshal C. A. White and his assistants, C. H. Miles and E. S. Mansfield, of Boston, and Day Baker, of New York, were in the first vehicle. Next came the big 5-ton Edison truck in which was the First Corps of Cadets band.

Among the different lines represented were vehicles for clothing firms, breweries, creameries, plate glass, paper, coal, candy, sugar, bakeries, steel, rubber, coffee, gasoline, ambulances, gas and electric light plants, express companies, department stores, lumber, tonics and newspaper delivery work. The trucks bore advertising signs that told of their merits, so that the spectators could get some idea of what the parade represented.

There were over a hundred vehicles in line, representing fifty-seven different commercial houses operating them.

### JERSEY BANISHES TOLL ROADS

HACKENSACK, N. J., Dec. 4—The last of New Jersey's toll roads passed out of existence last week when officials of the Public Service Corp. and several of the Bergen county Board of Freeholders officially ordered that no further tolls be collected.

The Freeholders voted to take over the toll road, 7½ miles long, the consideration being $1. This toll road was built by private subscription in 1802 and the four gates have been in operation ever since. For 25 years farmers and other owners of vehicles have been endeavoring to get rid of this road, which is the main outlet from the Jersey City, Hoboken and Weehawken ferries for northern New Jersey and Tuxedo Park, N. Y.

### BAY STATERS WILL FIGHT TAX

BOSTON, MASS., Dec. 2—In order to be prepared against all possibilities of a Federal tax on motor cars according to horsepower, suggested by Secretary McAdoo, President John H. MacAlman of the Boston Automobile Dealers Assn called a meeting of the directors this morning to act on the matter. He stated that in the event of any such legislation the burden would fall upon the dealers.

Couple-Gear trucks and tractors in Boston Electric Prosperity Week parade

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for the makers would shift it by cutting the commission probably, and it would not be possible to pass it on to the buyers of vehicles. So he suggested that as John H. Johnson, Buick; J. W. Maquire, Pierce-Arrow, and Joseph J. Donovan, Studebaker, were still active directors, and they comprised the committee that went to Washington and helped beat the last bill, that they stand ready to act again. So they will make up the delegation.

They were empowered to add to their committee members of the Boston Commercial Vehicle Dealers Assn. It was planned to have a conference before Congress opens with Congressmen James A. Gallivan, Peter F. Tague, George H. Tinkham, Michael J. Pheland and George E. Carter, all of whom represent districts in eastern Massachusetts in which the dealers do business.

### WAR DEPT. WANTS 27 TRUCKS

WASHINGTON, D. C., Dec. 4—Twenty-seven motor trucks are asked for in the estimates of the War Department which will be presented to the present Congress. If the trucks are purchased they will be used to form a motor truck train for one of the regular army divisions and will carry supplies between the base and the troops.

### N. Y. NATIONAL GUARD GETS ARMORED TRAIN

NEW YORK CITY, Dec. 5—When the New York National Guard goes to its annual maneuvers next summer it will have with it a thoroughly up-to-date armored motor truck train. It is expected that the train will cost close to $150,000, the money for which is being raised by several public-spirited New York millionaires. Governor Whitman of New York State last week approved an appropriation for $10,000 to keep the unit in commission.

Those behind the presentation of the new unit are the same men who were responsible for the motor truck train which accompanied the students of the preparedness camp at Plattsburgh, N. Y., last summer and which proved such a big success.

The number of battlecars the first train will contain has not been decided, although it is practically certain that one will be a Jeffery 2-ton truck, fully armored and carrying machine guns and 3-pounders, which can be steered from either end.

# Truck Club Out For 1,000 Members

## Advantages of Joining Being Urged by Truck Owners

NEW YORK CITY, Dec. 9—A thousand members by the first of the year is the aim of the membership campaign which was begun today by the Motor Truck Club of America. The present membership of the club is between 300 and 400. The campaign is a co-operative one in that each of the present members is sent the names of three prospective members situated in his locality which he is supposed to visit or call on the telephone.

His work in interviewing the prospective members is aided by literature telling of the benefits of club membership sent to each prospective in advance of December 9 by the general manager of the campaign, L. W. Statler.

The information sent the possible new members includes the Motor Truck Club platform, telling of its aims and purpose and several letters from owner members telling what advantages their membership has been to them.

The club is nation-wide in scope, although the present membership campaign is confined to the New York City Section. It is composed of owners and operators of motor trucks and has for its purposes the dissemination of knowledge which will enable its members to operate their vehicles more efficiently; the fighting of unfair legislation against the motor truck from city, state or government sources, and the general advancement of the motor truck as a mover of the world's goods. It also secures motor truck insurance at a greatly-reduced rate by a clubbing system. This reduction is so large that it more than offsets the annual membership dues of the club, so that an owner saves money by simply becoming a member, even if he does not receive other advantages.

The result of the campaign will be published in the next issue of THE COMMERCIAL VEHICLE.

### CHICAGO E. V. A. TALKS SALES

CHICAGO, Dec. 3—Ways and means to boost the sales of electric trucks were discussed informally at the meeting of the Chicago Section of the Electric Vehicle Assn. of America, held in this city last week. The subject was debated from the viewpoints of the maker, owner, dealer and garageman. The need of a larger representation of electric truck manufacturers in Chicago was brought out and it was suggested to inaugurate a co-operative billboard advertising campaign in order to increase the sales of electric trucks in the Chicago territory.

Another point brought out was the great need for the education of the prospective truck owner to the inherent merits of the electric truck. The garagemen's sentiments were expressed by a statement of one of their members to the effect that the manufacturers could gain their active co-operation only by making it financially worth while for them to act as electric truck missionaries.

The owners' viewpoint was summed up in the need for a greater number of charging stations and some sort of battery exchange system whereby the trucks can be kept continuously at work for longer periods.

### S. A. E. MEETS JAN. 4-6

NEW YORK CITY, Dec. 10—The program of the winter meeting of the Metropolitan Section of the Society of Automobile Engineers calls for a 3-day conclave at the Engineering Societies building, 29 west Thirty-ninth street, from January 4 to 6. The Standards Committee will report on January 4 and the general meeting will be held on January 5 and 6. The report of the Truck Standards Committee will be given by W. P. Kennedy, consulting engineer.

### WOMEN DRIVE BRITISH TRUCKS

NEW YORK CITY, Dec. 10—The great majority of motor trucks now engaged in other than government haulage throughout Great Britain are driven by women, according to one of the prominent British motor truck dealers who recently arrived in this country. Most of the experienced men drivers have joined the colors and are driving trucks either on the Continent or those in the munitions service in England. For this reason the British merchants desire light vehicles of from 1 to 2 tons capacity which are easy to steer and manipulate. Some form of motor starter is also demanded, to make it unneeessary for the women to crank the motor in starting.

### 65,000 MOTORS ON FRENCH LINE

NEW YORK CITY, Dec. 7—There are 65,000 motor vehicles, including both passenger cars and motor trucks, supplying the French Army in France, according to Charles Ryer, motor vehicle expert, who just returned to this country from France on the Anchor liner Cameronia, which reached New York today.

### MID-WEST S. A. E. ELECTS

CHICAGO, Dec. 4—Officers of the Mid-west Section of the Society of Automobile Engineers were elected at a meeting held here on December 2 at the Chicago Automobile Club. Members of the society from Illinois, Indiana, Wisconsin, Minnesota and Iowa attended.

F. S. Place, vice president of the Buda Co., was elected chairman; J. W. DeCou, factory manager of the Thomas B. Jeffery Co., vice chairman; C. W. Steiger, president, Stromberg Motor Devices Co., secretary-treasurer; Darwin S. Hatch, editor, Motor Age, secretary and H. W. Connell, Central Continuation School, Milwaukee, assistant secretary.

Electric vehicles parading in Boston, showing G. V., Baker and G. M. C. trucks

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A provision supply column on the French front. The trucks have brought supplies from the railhead, probably 20 miles to the rear. They are transferring their loads to a greater number of regimental horse wagons to be distributed to the various quarters

# Routine of Motor Service Back of the Line

## Trucks Are Link Between Railroad and Regiment

By W. F. Bradley

EVIDENCE of the necessity of motor trucks in modern warfare—fighting with long-range artillery and from subterranean points of vantage—is contained in the accompanying illustrations, just obtained from the firing line in France.

The view at the top of this page shows a depot on the French front in which a provision supply column, consisting of 3-ton trucks, is lined up and distributing food to the regimental horse-drawn wagons. Owing to the long range of modern artillery, it is impossible to make use of the railroads immediately behind the battle line. Thus food has to be brought up from railroad depots and stores probably 20 miles to the rear.

To get the most economical service, the motor trucks always run under full load, leaving the final distribution of their supplies to the horse teams. This distribution being made in small quantities and with a constantly-decreasing load can, of course, be more economically undertaken by horses than by motor.

This does not apply to the ammunition columns, for each load has to go to one battery, and sometimes several loads to a battery. Thus **the ammunition is taken direct to the guns without any trans-shipment.**

Another important feature of army trucking is in connection with the wood required for the construction of trenches, underground shelters and winter quarters for the troops

Trucks taking loads of timber, above, from a newly razed forest, and unloading them back of the firing line for the construction of trenches and underground shelters of the bomb-proof type

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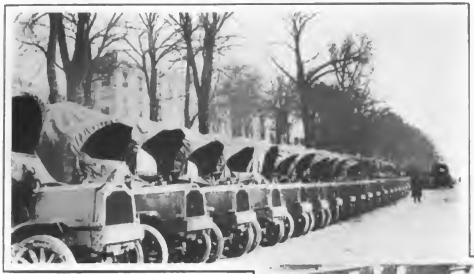

Above, fleet of 2-ton Packards at an important military depot in France. Below, a Pierce-Arrow used for the transporting of children from a village in the dangerous war zone being evacuated

The more important trenches being about 10 feet or more in depth, have to be strengthened with timber; the underground shelters have frequently 20 feet of earth above, and to support this much timber has to be used. Logs of trees are also used to make roads quickly for the passage of trucks and wagons to the batteries and men's quarters. This is done by dropping the logs crosswise and partly filling up with earth.

Whole forests in the army zone have been cut down for military uses. The timber is stacked in lots equivalent to a 3-ton load. Trucks are sent for it as required, and deliver it wherever needed. In this class of work a lot of hauling has to be done away from made roads and frequently across open fields. It is rough work for trucks, but they are standing up to it in a very satisfactory manner.

# Tractor School Near Paris

## France Teaches Farmers Motor Agriculture

FRANCE now possesses an agricultural motor school. The institution was opened a few days ago on a farm rented from the city of Paris, and about 20 miles to the northeast of the capital. Unlike the various State agricultural colleges existing in various parts of France, this school merely seeks to instruct men in the application of mechanical traction to farming. There is no doubt that there is a big scope for such a school, for the war has converted the whole of the agricultural population of France to the use of the gasoline tractor.

Prior to the war the sentiment of farmers was in favor of motor tractors, but now that the shortage of labor has become acute, and the government has given subsidies for the purchase of motor vehicles, all causes for holding back have been removed.

The school has at its disposal the five following American tractors:

(Continued on page 28)

Four American tractors being demonstrated by the French government at the republic's new agricultural motor school

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## Table IV—Summary of Cost per Piece

| Service | Per cent ratio of cost per piece to average cost per piece for entire delivery system. | | | |
|---|---|---|---|---|
| Parcel | | | | |
| Horse | 59.1 | | | |
| Electric | 53.8 | | | |
| Average per parcel | | | 58.0 | |
| Parcel and Bulk | | | | |
| Horse | | 75.5 | | |
| Electric | | 62.9 | | |
| Gasoline | | 104.3 | | |
| Average for parcel and bulk | | | 69.0 | |
| Bulk | | | | |
| Single horse wagon | | 137.0 | | |
| Double horse wagon | | 251.0 | | |
| Electric truck | | 230.0 | | |
| Average for bulk | | | 201.0 | |
| Furniture | | | | |
| Horse | 268.5 | | | |
| Gasoline | 395.0 | | | |
| Average for furniture | | | 305.0 | |
| Average per piece direct from store | | | | 84.0 |
| Suburban (parcel, bulk and furniture) | | | | |
| Woodlawn, gasoline truck | | 139.8 | | |
| Hackensack, horse wagon | | 113.9 | | |
| Newark, horse wagon | | 164.1 | | |
| Staten Island, horse wagon | | 137.7 | | |
| Sea Bright, horse wagon | | 331.0 | | |
| Flushing, horse wagon | | 124.5 | | |
| Far Rockaway, horse wagon | | 166.1 | | |
| Average per piece from depots | | | | 142.7 |
| Average per piece for entire system | | | | 100.0 |

# The Delivery System of R. H. Macy & Co.

(Continued from page 11)

period. These data included the number of pieces delivered from each of the depots for the same period.

VI—Observations of the vehicle performance made while riding with the vehicles as briefly summarized in Table I, page 10.

### Apportionment of Costs to the Various Classes of Service

The Dissection Book cost figures, mentioned under Data on Which Analysis is Based, were apportioned to the various classes of service on the basis described below. The services considered are those given in the first column of Table III.

**I—City Stable Expenses**, apportioned on the basis of the percentage of horse-days for the various services, the expenses thus apportioned to single-horse wagons being subdivided between parcel and parcel-and-bulk services in proportion to the wagon-days used in these two services during the 2 weeks' period.

**II—Wagon Boys' Salaries.** The portion of this total assigned to each class of service was taken in proportion to the triple product of: vehicle-days for 6 months in this service, by the average number of wagon boys or helpers per trip used in this service, by the average wage of the boys or helpers used in this service. In the case of the motor trucks, the vehicle-days for 6 months in the respective service was found by proportioning the total vehicle-days in the ratios of the use in the various services during the 2 weeks' period.

**III—Drivers' Salaries.** The total for this item was apportioned in the same manner as the Wagon Boys' Salaries, one driver per vehicle being used for all services. The wages of the second crews used on the transfer wagons were included in Motor Truck Expenses, Transfer, item IX.

**IV—Liability Insurance.** The Dissection Book figures included figures for each type of vehicle, namely, city wagons, small gasoline trucks, electric trucks, transfer trucks, city horse wagons, depot vans, and depot horse wagons. The respective totals for city wagons, small gasoline trucks, and electrics were apportioned to parcel, parcel-and-bulk, bulk, and furniture service on the basis of the wagon-days in these services during the 2 weeks' period. The amount for the transfer trucks was apportioned to the furniture and transfer services in proportion to the mileages in these two services during the 6 months' period, the expense thus found for transfer service being subdivided among the several suburban depots according to the estimated daily mileages for these depots.

**V—Depreciation, City Wagons and Trucks.** Apportioned to the various services on the basis of the wagon-days in each service during the 2 weeks' period.

**VI and VII—Depreciation, Horses and Harness.** These two items were apportioned in the same manner as City Stable Expense, item I.

**VIII—Depreciation, Motor Trucks.** Separate figures were available for the several types of trucks, namely, electric, small gasoline trucks operated from Woodlawn depot. The amounts for the electric and small gasoline machines were apportioned in accordance with the vehicle-days during the two weeks' period. The amount charged to transfer trucks was apportioned to transfer and furniture services as explained under Liability Insurance, item IV.

**IX—Motor Truck Operating Expenses.** Separate figures were available from the Motor Truck Log Book for the following classes: gasoline trucks at Woodlawn, electrics in city service, small gasoline trucks in city service, gasoline transfer trucks, and electric milk trucks. The amounts were apportioned in the same manner as Depreciation, Motor Truck, item VIII. The item for the transfer truck included the drivers' and wagon boys' salaries for the motor transfer service.

### Summary of Vehicle Costs per Day

From the total cost of the several types of vehicles in the several services for the 6 months' period, the cost per day was derived by dividing the 6 months' cost by the number of vehicle-days for this 6 months. The vehicle-days for the horse vehicles for the 6 months' period was given directly by the company's records. The total vehicle-days of all the motor vehicles for the 6 months' period was also given by the company's records; this total was apportioned to the various services on the basis of the vehicle-days in these services for the 2 weeks' period. The day basis for distribution of motor truck expenses was used in the absence of complete figures on mileages traveled by them. The cost per day of the several types of vehicles in the several classes of services as thus determined are given in Table III. In this table two values are given for the cost per vehicle-day of the depot services, namely, from the store, and from the depot. The latter figure was obtained from the total cost of depot units as given in the from the store column by deducting the transfer or transportation charges, lerriage, and salaries of entry clerks at the depots. In studying these figures it should be recalled that gasoline trucks are operated from the Woodlawn depot and horse wagons from the others; also, the depot at Far Rockaway is relatively small, and that at Sea Bright is not operated during the winter months.

### Delivery Costs per Piece

There are six units, any one of which may be taken as the basis of comparison of unit costs, namely:

1—Piece taken from store by delivery wagon.
2—Purchase taken from store by delivery wagon.
3—Group of pieces taken from store by delivery wagon to be delivered at one address; that is, the delivery from store.
4—Piece actually delivered by delivery wagon.
5—Purchase actually delivered by delivery wagon.
6—Group of pieces actually delivered by delivery wagon at one address; the actual delivery.

In any given case a series of ratios could be determined by observation whereby the unit cost based on any one of the units could be obtained readily from the unit cost based upon any other unit. In comparing unit costs reported in different studies care should be exercised to reduce the several data to the same unit base, as a large factor of error may be due to confusing such common expressions as piece, purchase, actual delivery, and also in failing to differentiate between the unit taken from the store and the unit actually delivered.

From the total cost of each of the delivery services during the 6 months' period, determined as outlined above, and the number of pieces taken from the store on each service during a similar period, as obtained by apportioning the 6 months' totals of the Dissection Book according to the percentages for the 2 weeks' period, there were obtained the costs per piece for each of the services. Table IV gives the percentage values of these costs as referred to the average cost per piece for the entire delivery system; the relative delivery expense per piece for the different services are likewise indicated by this table.

# PART III
# POSSIBLE CHANGES IN THE DELIVERY SERVICE

From the cost analysis given in Part II, there seems to be no doubt that the motor vehicles are performing the service to which they are now assigned more cheaply than could be done by horse-drawn vehicles. Referring to Table IV, page 28, it will be seen that the cost per piece for the parcel service is approximately 10 per cent less for the electric trucks than for the horse wagons. In comparing these figures it should be noted that the electric vehicles are serving routes more distant from the store than are being served by the horse wagons, the average distance from the store of the electric routes being 4.4 miles, and the average distance for the wagon routes being 1.7 mile. A rough estimate shows that were the electric vehicles used in the present horse-wagon zone, the cost per piece would be approximately 53 per cent of the average cost for the entire system, and were the horse wagons used on the present electric routes, the cost per piece would be approximately 65 per cent of the average cost for the entire system.

In the parcel-and-bulk service the electric vehicles as now used give a cost per piece, in per cent of the average cost for the entire system, of 62.9 per cent, as against 75.5 per cent for the horse-drawn vehicles. The average distance from the store of the routes covered by the electric trucks is 6.7 miles, as against 3.7 miles for the horse wagons. In this same service the gasoline trucks give a cost per piece of 104.3 per cent of the average cost for the entire system, their routes being still further from the store than the electric routes. The electric also compares favorably with the double-horse wagon in the bulk delivery, giving a cost in per cent of the average cost for the entire system of 230 per cent per piece, as against 251 per cent per piece for the double-horse truck.

These figures would indicate that the company could safely replace a number of its horse-drawn vehicles in the city service by electric trucks, provided the routes were rearranged to allow for the greater amount of work per day done by the electrics as compared to the horse wagons due to the greater speed of the former. Just how much saving could thus be effected cannot be accurately determined until more extended data on the performance of the present equipment have been obtained.

It should also be noted from Table IV that the gasoline trucks at Woodlawn make a favorable showing compared with the horse-drawn vehicles at the other depots. In comparing Woodlawn with the other depots, account should be taken of the differences in the density of deliveries in the various suburban territories. A plot of the cost per delivery vs. number of deliveries per mile showed that in suburban territory the cost of delivering decreased as the density of deliveries increased. In this plot the cost for Woodlawn, where motors were used, fell upon the line connecting the points for the other depots, at all of which horses were used.

It would seem that gasoline trucks might be more extensively used in suburban deliveries, particularly in the territory served from Newark and the suburban territory on Long Island. However, it was not possible

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# Suggested Cost and Performance Accounting System

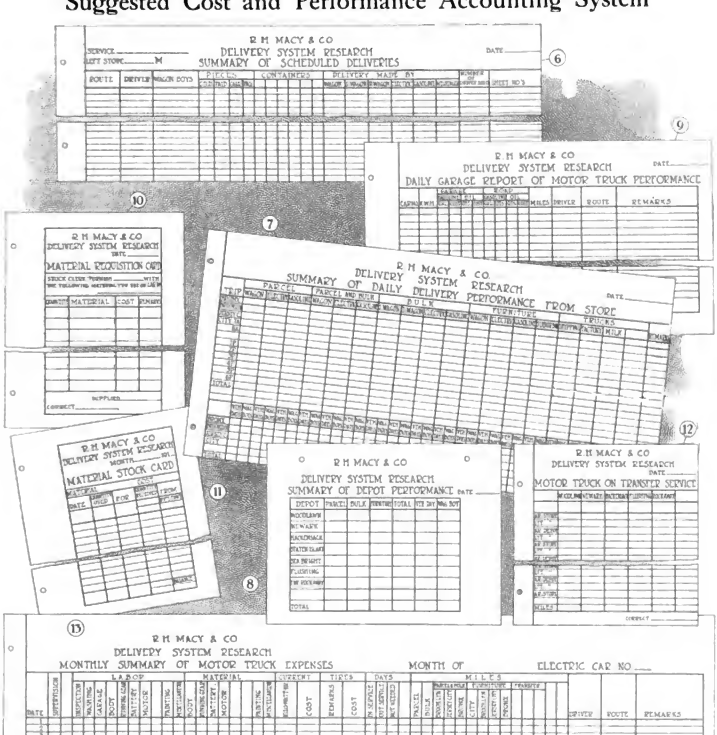


Fig. 6—Form for summary of scheduled deliveries
Fig. 7—Form for summary of daily delivery performance from store
Fig. 8—Form for summary of depot performance.
Fig. 9—Form for daily garage report of motor vehicle performance
Fig. 10—Material requisition card
Fig. 12—Daily report card for transfer motor trucks
Fig. 13—Form for monthly summary of motor truck expenses, in this case for electric trucks

Refer to chart on page 8 to find relation of these forms to each other and points of origin and destination

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to make definite recommendations in this respect, inasmuch as additional data on the performance of the present suburban delivery system are required for a close estimate of the possible saving in cost.

At present the Long Island suburban territory is served chiefly from depots at Flushing and Far Rockaway, from both of which horse wagons are operated; motor service from the store is maintained to the Port Washington and Hempstead districts. It was suggested that all of this territory could best be served from a single large depot. Although estimates of the expense of operating such a combined depot, either with horses or trucks, were not justified from the data then at hand, the study has suggested that such a change could be made with advantage, in that the establishment of a large depot in a central point, such as on the eastward of Jamaica, would permit the extension of the delivery service to include Oyster Bay and Roslyn. On account of the long distance, these extended routes could probably be handled best by gasoline trucks, in which case neither the Oyster Bay nor the Roslyn districts now have sufficient business to warrant daily service for each, so that a single car could serve both routes by covering each on alternate days; the real-estate development which is now going on in this entire district would indicate that ultimately both routes would need daily operation.

# PART IV

## RECORDS OF VEHICLE COST AND PERFORMANCE

In order to determine the proper cost of the several services included in the delivery system, detailed reports upon the use of vehicles in the different services, as well as upon the deliveries made must be available. The company's statistical work referring to the delivery system is divided among the several branches of the delivery department and the original data sheets are difficult to assemble. By transferring all of the accounting referring to the cost of deliveries to the auditor's office, the set of forms described below will enable the auditor to keep a record of the delivery performance, by the aid of which the proper charges for each service could be determined.

Another feature of this scheme is the centralization of the cost records of the delivery equipment. Data on the various delivery routes are required by the superintendent of deliveries as well as the auditor. With this in view, it is suggested that a summary of all regular deliveries be made out by the head entry clerk of each sorting room and the manager of each depot after the drivers have taken out their loads. The items suggested for this summary are shown in Fig. 6. After being totaled, these sheets will be sent to the delivery superintendent's office.

As the data of Fig. 6 is too detailed for cost purposes, the summary shown in Fig. 7 may be compiled in the delivery office. A summary of the suburban depot sheets would also be made out as in Fig. 8. When totaled, both summaries would be forwarded to the auditor's office.

From the reports, the auditor's office would make up a monthly summary of the daily delivery performance, summarizing the number of pieces handled under each type of service, for each district and for each type of wagon used. A second summary to the number of vehicle-days and wagon-body-days would also be compiled, using the same headings as are used for compiling piece delivery. These two summaries would be of value in determining the distribution of expenses among the several services. The inability to obtain performance data of this character has been a handicap in this investigation.

The data on the actual operation of the motor vehicles would be contained in the Daily Garage Report, as shown in Fig. 9. This form would be made out by the garage superintendent and sent to the auditor's office daily.

All repair men would make out a daily time card, giving the amount of time spent on each car and the nature of the repair. In case material is required for any car, the repair man would write out a stock requisition card, Fig. 10, which must be approved by the garage superintendent. After the order has been filled by the stock clerk, the requisition card is sent to the auditor's office. The repair men's time cards would also go to the auditor's office daily.

The material stock card shown in Fig. 11 provides for a perpetual inventory of the material in the stock room. A separate card is required for each stock bin and at the end of each month the cards are sent to the cost clerk. In order to carry out such a method of checking stock it would be necessary to arrange for a garage stock room in which all motor truck parts would be kept.

In order to collect data on the trucks used for transfer service, the daily report card shown in Fig. 12 could be made out by the man in charge of the driveway and sent to the auditor's office.

From the records outlined in Figs. 10 to 12 and from the repairmen's time cards, the auditor's office could make out the monthly summaries of truck expenses, see Fig. 13, and thus determine the daily expense for each car and the totals for the month.

The actual unit cost per piece handled during any period may be determined very readily by this system. The assembly of all the relative data in a department that specializes in statistical work would simplify the task of arriving at the proper unit costs for each of the delivery services.

Wichita 2-ton truck used by Juliette Fowler Orphan Home, Grand Prairie Tex., for trucking and bus service

## SUMMARY OF SOME OF THE MORE IMPORTANT CONCLUSIONS AND SUGGESTIONS

In addition to various points of little general interest regarding the operation of the delivery service, which were pointed out to the officers of the company from time to time, the following conclusions from the study may be mentioned:

1—Many of the regulations governing the deliverymen must be broken if the men are to complete in a reasonable time the amount of work now assigned to them. The rules which are generally disregarded include those in regard to backloading, the delivery of all paid purchases by the driver, the handling of the money by the wagon boys, and the leaving of the wagon unattended, especially in the city districts.

2—The drivers in general travel over their routes in a very efficient manner. The course taken as a rule is the best one for the particular load.

3—In the cases of drivers who find it necessary to list the pieces in their load in the order in which they are to be delivered, there would result a saving in time if the drivers had an address slip for each purchase in the load, which slips could be arranged by the driver in the desired order for making the deliveries. The present sales slips could possibly be detached from the parcels and used in this manner, or an additional copy of the address slip could be used.

4—On routes on which but one delivery per day is made, the vehicles should leave the store or depot early enough to reach their first delivery at about 8 a. m. In a few cases this will necessitate the men reporting for work rather early, but on account of better delivery conditions in the morning their time on duty would be decreased.

5—A broad canvas strap with snaps at each end would be a great aid to the driver in building up and holding parts of his load in place. The strap should be at least 12 inches wide and in length equal to the inside width of the vehicles.

6—A complete set of forms for obtaining detailed performance and cost records for each type of vehicle in each class of service is outlined.

7—Where motor vehicles are now used they are operating at as low a cost, and in many cases at a lower expense per piece, than could be obtained with horse-drawn vehicles in the same service.

8—An appreciable saving could be effected by a more extensive use of electrics in the city service.

9—The Newark territory and the suburban territory on Long Island offer a field in which gasoline trucks could be used with an appreciable saving in cost over the horse wagons now used.

10—Flushing, Far Rockaway, Hempstead and Port Washington could be served with advantage from a single depot. If motors were used the present delivery territory could be extended to include Roslyn, Oyster Bay and Huntington.

## Orphans Carried to Sunday School by Truck

LOCATED more than a mile from the town of Grand Prairie, Tex., the Juliette Fowler Orphan Home found it very expensive to obtain supplies by horse wagon and to send its wards to Sunday school, because carfare had to be furnished, until a motor truck was donated for the purpose. Now every Sunday afternoon the truck starts out for the next town with its load of small girls and boys, among which, perhaps, are some of the great personages of the next generation. It also brings them home after school is out, thus giving the children 2 or more miles of cross-country riding with all its health-giving advantages.

The truck, a 2-ton Wichita, was donated by J. G. Culbertson, general manager of the Wichita Falls Motor Co., Wichita Falls, Tex. The home is under the jurisdiction of the Christian church and is maintained by many public-spirited Texas women.

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# SPECIAL SERVICE

SAURER MOUNTAIN CLIMBER STOPPING TO THROW OFF THE HELPING LINE AFTER PASSING THE SHARP CURVE AND SEVERE GRADE AT DEVIL'S ELBOW

**By John Grant**

MOUNT WILSON and its toll road, which climbs to 6,000 feet elevation in 9 miles, has been conquered by a Saurer truck. Weighing 7,300 pounds, and built to carry a 6½-ton load, it carried a load of 22,235 pounds from the freight yards of the Carnegie Institute in Pasadena to the summit of Mount Wilson, where the new solar observatory is being constructed.

The feat was not performed as a stunt or a mere demonstration, but as a piece of practical business.

The load consisted of a steel casting which will be used as a section of the pedestal on which a 100-inch telescope of the new observatory will rest. The only possible way to transport this was by motor truck. On account of the many narrow turns in the trail it was impossible to use horses or a trailer; it was impossible to utilize a hoist and winch the casting up the mile-high ascent, because of the deep canyons and rugged peaks. So the entire load was entrusted to one truck.

The weight on the wheels of the truck represented approximately 15 tons. In the yard of the Carnegie Institute at Pasadena the wheels sank 3 inches into the roadway. It required 6 hours and 20 minutes to make the climb from the toll gate at Altadena to the observatory at the summit.

It took an old-timer in the mining industry to get the most out of the sight of Jack Stoner accomplishing this task.

To the newspaper men who went along, and the photographers, it meant a day that in sporting interest was as exciting as a Vanderbilt Cup Race—and the professional hopelessness that they could ever make anyone see the event as a thing as overpoweringly marvelous as it was. The Mount Wilson road is too long, steep, twisty, and above all, risky in its skirting of 1,000- to 3,000-foot cliffs, with lower and higher backgrounds requiring a whole sweep of the eye, for one to hope to give by such trifling things as words and pictures even more than a tiny bit of realization of the power and control it took to conquer it. But to the mining man, Stoner will be known as the man who abolished the distinction between practical and impractical prospectors. The old-timer who prospects around the worst of remote mountain heights knows he can have his transportation for machinery and ore now, if he can make a strike.

The lashing of the steel to the truck, with twisted steel cables tightened by jacks, made truck and load practically a structural unit, with the load balancing over the rear wheels. In fact, the front wheels were so light that on the few occasions where a help was taken from the empty Mack truck that was run up in front of the burden-bearing Saurer, the front wheels of the Saurer were lifted, due to the fact that anything pulling from ahead on these grades necessarily pulled upward, so that steering on the loaded rear truck was lost, and anything more than a momentary help was impossible.

At the worst turn of all, Devil's Elbow, at about 1,000 feet elevation, when the helping truck started it jerked the front wheels of the Saurer several inches in the air, and slacked off after pulling a few feet, while the Saurer made the rest of the grade and turn on its own power. The first stop of more than a few seconds duration was for luncheon, more than 3 hours after the beginning of the continuous climb from the bridge at the foot of the grade below the toll house.

At that point the correspondent of THE COMMERCIAL VEHICLE

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THE MOVIE MAN RECORDS AN ATTACK UPON A PARTICULARLY SCENIC BREAK BETWEEN THE CLIFF AND THE CHASM

and others felt of the radiator and cylinder jacket and they were not so warm that it caused discomfort to hold the hands against them tightly for an indefinite period.

At Buzzard's Roost loop, 5 miles up, the truck negotiated a turn around a bold shoulder of the mountain at a point where some years ago an old Mack truck had slid off and fallen down the mountain some 1,000 feet, till it was stopped by a big live-oak tree. Later it was fished up by the insurance company, the engine and gearset salvaged, and after some repairs placed upon a new frame and sent over to Europe to see if any gunner in the continental disturbance was able to polish it off.

At a point known as the Desert a stop was made for lunch, which had been expected at the 12:10 stop, but had been carried to the higher point through a misunderstanding. After 15 minutes for luncheon, Mr. Stoner climbed aboard the Saurer and made the rest of the trip, which was a constant succession of zig-zags along the steeply climbing road clinging apparently to a narrow ledge between towering cliffs and the tremendous gulf of the canyon of the Little Santa Anita, whose waters flowed beneath the trees 2,000 feet below, and with no obstacles to the direct vision out over the San Gabriel valley, 4,500 feet beneath the level of the eye.

Going ahead, and looking down on the titanic surroundings, the rugged mountain, overlooking the plain with its many cities, the sea, and islands 60 miles away clear cut in the sunshine, the event grew, rather than shrunk, in the estimation. A piece of steel so big that no man had ever dared plan to take more than half of it up a great hill was being brought steadily and certainly up the famous Mount Wilson road—a true and final conquest of gravity by man.

ONE OF THE ABRUPT TURNS WITH A 22,000-FOOT PITCH-OFF AS A PENALTY FOR FAILURE, WHICH TESTED THE TRUCK TO STAND TORSIONAL STRAIN—NOTE THE UP GRADE

Chance had come in to make it a sporting event of note, for the piece coming up, originally cast in two pieces, through an accident had to be united where suitable heavy machinery was available, in the city below, and taken up in one piece. And the observatory, which has taken up all its other materials in two Mack trucks, asked J. A. Stoner, the agent for Mack and Saurer trucks, what could be done. Stoner said he would try it with the Saurer he had on the floor—and here he was, actually driving the truck, making the grade, where at times a 6-inch overrun would have meant a quarter-mile pitch-off.

The run was finished with the truck and its load backed into the door of the great observatory, and the truck was run down the mountain that night in the dark by one of the drivers who makes the trip every day with a Mack. Stoner's trip up with the big overload took 16⅔ gallons of gasoline

THE TRAIL EVER WINDING AND EVER CLIMBING THROUGH THE PINES OF THE UPPER GRADES

for the 12 miles from railroad to mountain top, and ⅔ gallon of oil.

At the summit, after continuous hauling, the hand could be placed firmly on the radiator or cylinder jacket with no feeling of discomfort. The efficiency of cooling, which enabled the engine to deliver full power at all times, was a principal factor in the success of the haul.

Where Stoner had to back up to negotiate a sharp turn on the grade, a tumble over the cliff was the penalty for an overrun in any direction. Crowding the rock would have thrown the outfit over by tipping over from pressure of the wide upper load against the rock, as the wheels ran in, and running a front or rear outer wheel off would not have left time for a man to jump. In these manipulations of his ponderous outfit Stoner put absolute reliance on his motor air brake. "With that in mesh in low gear, I knew I couldn't slide over," he says.

The truck was not modified in any way from the usual stock type before making the trip. Her muffler was removed and an overhead spring, of the regular catalog type, was mounted over the rear axle.

The haul was witnessed by over 100 spectators. It was filmed by the Pathe News, No. 96, issued December 2 in New York, and is being shown all over the country as the most remarkable truck performance on record.

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## WEAK BRIDGES HINDER TRUCKS

PORTLAND, ME., Dec. 6—Dealers in motor trucks in Maine have at last awakened to the fact that the state should do something to strengthen the bridges on the main highways or the prospect of selling motor trucks will vanish. Accidents have happened where trucks went through bridges. These have been reported in the papers with the result that it has made buyers skeptical, and has made it harder to convince prospects that the commercial vehicles are necessary in transportation.

The latest occurrence happened a couple of weeks ago when a 2½-ton Kissel truck went through a bridge over Sandy river at Strong. The truck went completely through the flooring and dropped a distance of 25 feet. It was a miracle that no one was killed or injured. The truck landed on the grassy banks of the river, so that its owners were able to haul it up and put it into commission again.

The bridge where the truck went through is a suspension one which was erected 60 years ago and was the first of its kind to be built in New England. It has a span of 225 feet.

Following the accident at Strong, a big truck owned in Portland, loaded with merchandise, went through the planking of the old Martin Point bridge which connects East Deering and Falmouth. While it did not go completely through the flooring, it did sink through to the hubs of the forward wheels. No one was injured, but had it gone completely through, truck and occupants would have been lost, for the tide was high at the time and the river very deep. And last week a motor truck crossing a bridge in New Hampshire just over the Maine line went through a bridge. No one was injured, but the fact that three such accidents should follow at weekly intervals has made the dealers sit up and take notice. So they propose to have their representatives in the legislature take the matter up and have all the bridges inspected and the weak ones strengthened.

Up in the eastern section of the state, Aroostook county, where the big potato crops are raised, motor trucks could be used advantageously if the roads and bridges were put in thorough shape. And in the northern section, where the big lumbering operations are carried on, more motor vehicles are being used every year. But the lumber companies have to strengthen the bridges there. And there are so many streams the chances of selling trucks are not very good until better conditions exist, but once the roads and bridges are improved there should be a good sale of trucks.

## GOTHAM BUS FIGHT UNDECIDED

NEW YORK CITY, Dec. 7—Nothing has been decided in regard to the new motor bus franchises in this city, although the Committee on Franchises of the Board of Estimate and Apportionment reported favorably on the application of the New York Motor Bus Co. The lines which that company would run if their application for a franchise is granted would conflict with some of the street car lines as well as the bus routes maintained by the Fifth Avenue Coach Co. at the present time.

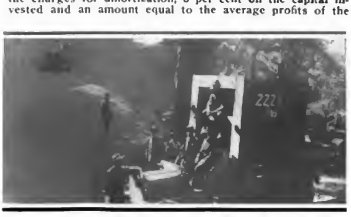
Since the controversy started last month, the Fifth Avenue company presented a new proposal for the extension of its present lines whereby the city would obtain one-half the net profits after a certain preferential has been set aside. This is suggested to be determined by the cost of bus operation, the charges for amortization, 6 per cent on the capital invested and an amount equal to the average profits of the company for the last 2 years. Under this proposal the Fifth Avenue company would guarantee that the annual payment to the city would never fall below $75,000. It further asserts that the city's payment for the first year would be $107,500, and in 7 years the total paid would not be less than $225,000.

The company proposes to charge the same fare of 10 cents as it does on its present lines, but to install a system of universal transfers. This is a step in the right direction, although it is open to argument as to whether this would be more advantageous to the public than the 5-cent fare offered by the New York Motor Bus Co. or not.

Many of the lines asked for by the latter company are included in the proposal of the Fifth Avenue company, but others are omitted. This has caused much opposition to the proposal because those lines omitted would tend to aid in reduction of the passenger traffic congestion on elevated, subway and street car lines.

Much organized opposition has developed against the granting of the bus franchise to the New York Motor Bus company on the part of the traction interests, because they admit that the proposed routes would take the cream of the short-haul traffic from the street car lines, and therefore force them into bankruptcy. While proof that this would be the case if the street car lines were properly operated is not forthcoming, it would appear to the impartial observer that one of two things should be done without further delay. Either force the street car lines to give adequate service by the use of a greater number of cars so as to reduce the passenger congestion, or else grant the bus franchise which will **give the best service for the least money**

THE SAURER ADDS ITS 11-TON UNIT TO THE MONUMENT TESTIFYING TO THE ACHIEVEMENT OF THE MACK TRUCKS WHICH HAVE CARRIED ALL THE OTHER OBSERVATORY MATERIAL TO THE SUMMIT



WHERE THE SERVICES OF THE MACK TOW WERE DISPENSED WITH

## Freight Congestion

(Continued from page 12)

transportation of freight from now on. It is demonstrating its superiority and economy on short haul freight work. It is almost daily serving in emergencies where railroads fail, such as in floods, to transport passengers when strikes and other difficulties interfere with street and other railway service, and the familiar franchise-holding once-a-day combination train is giving way to the motor bus and stage.

In the great war across the water railroads are used almost solely for long-haul transport of men, munitions and supplies. It is the motor truck which completes the important stage between this and the actual point of consumption.

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# Bodies Designed for Particular Conditions

## Side- and End-dump Types—Others for Pipes and Bottled Water

Fig. 1—Body on converted passenger car for plumbers' supplies

### Side-dumping Body for Autocars

SIDE-DUMPING, the new style of body recently brought out by the Autocar Co., Ardmore, Pa., for use on vehicles of its manufacture, has been developed to meet the requirements of those having need for a truck which will dump all or a portion of its load on either side. This type of body is particularly advantageous to contractors, building supply men, coal dealers and others who must make many deliveries in narrow alleys where it is very difficult for the vehicle to back into position against the curb to discharge its load.

The new Autocar body is of wood, metal lined, and is mounted on a structural iron under-framing. It is divided into two parts of equal capacity by a transverse crosspiece at the center. Each compartment has two gates, one on each side, hinged at the top. As it can be tipped to either side at will, half of the load can be deposited on one side of the truck and half on the other.

Adjustable flareboards are hinged to the bottom on both sides. These are used to cause the load to be thrown far enough away from the truck so that when half of the load is dumped on one side and the other half on the other, the vehicle may pass between the two heaps of material without interference to the driving wheels.

The body is tipped by hand. The mechanism for this purpose consists of a longitudinal shaft beneath the body around which are wound chains carried over two A-frames at both front and rear, two for elevating one side, and two for the other. The longitudinal shaft is revolved by means of worm and gear by another shaft at right angles to it and extending crosswise of the frame and clear through it on each side. Both ends of the latter shaft are squared for fitting a conventional crank handle turned by the truck driver. In operation, the latter stands on the side opposite that on which the load is to be dumped. It is shown in Fig. 3.

### Body for Pipes on Passenger Chassis

WITH sills and bolsters designed to appear light, the body shown in Fig. 1 is mounted on a Packard 30 passenger car chassis used to delivery emergency orders of plumbing goods, such as pipes, bath tubs, washstands, etc., etc. The appearance of lightness is secured by cutting away all surplus material on both the side sills and bolsters. The former are cut on the arc of a circle between the points of support on the sills. The tops of the latter are not straight but are cut away between the bolster points, giving a wave-like profile.

The body is of the open, side-staked type, but with the stakes made into unit sections on each side by three rows of horizontal stiffeners near the bottom and one continuous one on the top. The floor extends out beyond the stakes on each side, forming a narrow shelf on which long pipes are carried. These are lashed to the stakes and when long extend beyond the front of the body alongside of the cab, and when extremely long forward of the dash. This eliminates

Fig. 2—Side and end views of a novel type of body for carrying cases of bottled water. It is mounted on a 1-ton Kelly truck owned by the National Pure Water Co., Kansas City, Mo. Cases are carried on the flat bottom and also on the sloping flareboards, the stringers shown preventing those on the flareboards from sliding down against those on the bottom. Note pivoted bar at the rear end

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Fig. 3—The Autocar side-dumping body

the necessity of having the pipes extend several feet aft of the rear end of the body, which is very dangerous in congested traffic to both vehicle and pedestrians.

The body is the product of Jacob Press' Sons, Chicago, and is mounted on a vehicle owned by the Federal-Huber Co., a plumbing concern, also of Chicago.

## Contractors' Body With Power Dump and Winch

MAKING use of the latent possibilities of a motor truck motor, the 5-ton Mack shown in Fig. 4 is equipped with a power-dumping box body, a power winch with a large winding drum, and abutting nigger-heads, all driven from the truck motor. By running a line around the nigger heads on either side as is most convenient, and making it fast to a tree or other stationary object, the truck may pull itself out of soft ground or ascend steep hills with its full load without the aid of another vehicle. Heavy objects may be drawn onto the truck by the winch and may be lifted to a considerable height above the ground at their destination with the aid of a block and tackle.

The elevating mechanism consists of a box-shaped fabricated steel framework positioned directly aft of the driver's cab which carries on its rear uprights two vertical endless chains. The latter lie in vertical planes parallel with the center line of the truck and run over sprockets at top and bottom which are mounted on two horizontal shafts on the rear of the framework. Slack in the chains is taken up by the use of two adjustable distance rods between the shafts, one on each side in the way of the sprockets. Attached to each of these chains is a bell-crank, the free end of which oscillates in a slot in a vertical arm attached to the under side of the body at the front.

Fig. 4—Mack 5-tonner with dumping body, hoisting winch and nigger-heads

The winch is carried inside of the box framework of the elevating mechanism. It is mounted on two castings bolted to the top of the side members of the truck frame, one on each side. It is driven through gears from the motor and in turn drives the nigger-head shaft directly beneath it.

## Trim-looking Hotel Bus for Twenty Passengers

PRETENTIOUS, yet dignified by its simple lines, the bus body shown in Fig. 5 is one of two mounted on two 2-ton Chase chassis recently sold to the Onondaga hotel, Syracuse, N. Y., and used to carry its patrons between the railroad stations and the hostelry. Its feature is its resemblance to a limousine appearance, large bevel plate windows, coach side lamps and highly-polished side panels.

It has a capacity of twenty passengers, including the driver, who sits in a compartment of his own, the floor of which is several inches below that in the body proper. Although there is no partition between the driver's compartment and that for the passengers, the difference is further accentuated by a drop in the profile of the top, that over the driver's seat being several inches lower than the remaining portion. The passengers are carried on seats along both sides with an aisle between.

Two doors are employed, one on the left in the way of the driver's seat and the other at the rear on the opposite side.

The bus is closed at the front with a clear-vision windshield in front of the driver's seat with a sash window next it. The windows are especially large, about half the height

Fig. 5—Trim-looking hotel bus on 2-ton Chase chassis

of the body, and extend clear around the back from the front on one side to the front on the other. Even the doors have windows, so that the interior is extremely light. The interior is heated by radiators utilizing the heat of the motor exhaust.

## Dish-like Body to Carry Bottled Water

DESIGNED to carry cases of bottled water, the dish-shaped body shown in Fig. 2 consists of a flat bottom with two flareboards. Stringers are run fore and aft where the bottom and flareboards join. These support the cases carried on the flareboards and prevent them from sliding against those loaded on the flat bottom between. The body is open at the rear, but provided with a removable horizontal flat steel bar held on two brackets attached to the flareboards. The bar is pivoted at one end.

This type of construction keeps the cases close to the ground, where they may be easily loaded or unloaded without much lifting on the part of the driver. Wood is used throughout with steel reinforcement. The body shown is mounted on a 1-ton Kelly truck owned by the National Pure Water Co., Kansas City, Mo.

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# Gotham Garbage and Ash Tractors Make Good

At the right, one of the twelve G. V. gas-electric tractors used as vehicles of all work in Father Knickerbocker's model street-cleaoing district, shown in the act of being loaded with garbage. Below, to the left, is shown the maoner in which the separate steel compartments forming the tractor body are lifted out of the frame to be dumped in the scows at the waterfront. Below, to the right, the compartment io the act of being dumped

Twelve of these tractors are now in use in the model street-cleaning district of New York City for the house-to-house collection of garbage, ashes and refuse. Each unit displaeed five horse vehicles. While the tractors are now used only for the collection of garbage, etc., in the day, they will also be employed for street washing at night by the uee of trailers. It is also proposed to use the units for snow sweeping aod snow removal with bottom-dump trailers

## Tractor School Near Paris

(Continued from page 19)

Aultman & Taylor, Bull three-wheel tractor, Twin City three-wheel tractor, Bijou twin-cylinder tractor, and the Bullock 4-cylinder track-laying machine. The course is more of a mechanical than an agricultural nature. Practical driving lessons are given in the field, but more attention is given to workshop instruction and to repairs, so that the men may be able to keep their machines in the best of condition without outside help.

Nine-tenths of the students are farmers who need mechanical and not agricultural instruction. The inauguration of the school brought together strong farming interests. army officers, government representatives and motor vehicle manufacturers. The present opportunity is an excellent one for American manufacturers of agricultural motors. French manufacturers have given attention to this subject, but very few are in a position to produce at present and none can deliver in quantities.

The demand also extends to small, cheap, stationary gasoline engines for driving various farm machines. The demand will be of a permanent nature and will also increase in volume, for land cultivation is of such national importance that the government is interesting itself in applying modern methods to agriculture.

Liberty Bell about to leave San Francisco expositioo for its home in Philadelphia oo a White truck

## NEW BOOKS

**Questions and Answers"** relating to modern motor car design, construction, driving and repair, by Victor W. Page, M. E., in the new third edition, has recently been issued by the Norman W. Henley Publishing Co., 132 Nassau street, New York City. The new edition is enlarged and reviseed and is thoroughly up to date in every particular.

It is written in the form of a catechism and divided into thirty-seven lessons. This plan adapts it especially well to use as a textbook, while the arrangement of the lessons facilitates ready reference to any subjcct connected with the design, construction, driving or repair of motor vehicles. There are 623 pages of text in the enlarged edition.

There is a goodly sprinkling of motor truck matter in the work, and the book seems admirably adapted to the truck owner or operator who desires to brush up on the technical features of his vehicle, or the novice who wants a book to give him the fundamentals of truck construction and operation in such manner that he can pick out the features which he is desirous of studying first.

It is bound in green cloth, 5 by 7½ inches, and contains 350 illustrations. both half-tone and line, and several folding charts. It sells for $1.50 net.

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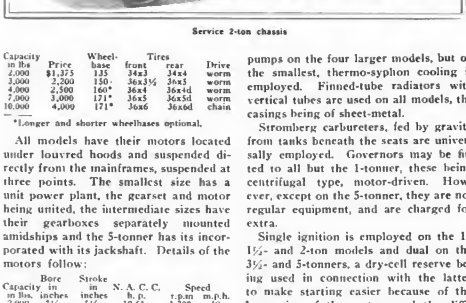
# Commercial Vehicles

## Service Line Complete

FIVE models from 1 to 5 tons comprise the 1916 offering of the commercial vehicles of the Service Motor Truck Co., Wabash, Ind. Four of these models are worm-driven, the 5-tonner having chain drive. The double-friction change-gear formerly employed has been dropped and all models for the current season employ standard clutches and sliding gearsets. The five models are as follows:

3-ton Nelson & Le Moon




Service 2-ton chassis

| Capacity in lbs | Price | Wheel-base | Tires front | Tires rear | Drive |
|---|---|---|---|---|---|
| 2,000 | $1,375 | 135 | 34x3 | 34x4 | worm |
| 3,000 | 2,200 | 150* | 36x3½ | 36x5 | worm |
| 4,000 | 2,500 | 160* | 36x4 | 36x4d | worm |
| 7,000 | 3,000 | 171* | 36x5 | 36x5d | worm |
| 10,000 | 4,000 | 171* | 36x6 | 36x6d | chain |

*Longer and shorter wheelbases optional.

All models have their motors located under louvred hoods and suspended directly from the mainframes, suspended at three points. The smallest size has a unit power plant, the gearset and motor being united, the intermediate sizes have their gearboxes separately mounted amidships and the 5-tonner has its incorporated with its jackshaft. Details of the motors follow:

| Capacity in lbs. | Bore in inches | Stroke in inches | N. A. C. C. h. p. | Speed r.p.m | m.p.h. |
|---|---|---|---|---|---|
| 2,000 | 3½ | 5½ | 19.61 | 1,200 | 18 |
| 3,000 | 4¼ | 5½ | 27.20 | 1,000 | 14 |
| 4,000 | 4½ | 5½ | 27.20 | 870 | 12 |
| 7,000 | 4½ | 6 | 32.40 | 900 | 11 |
| 10,000 | 4¾ | 6¾ | 36.15 | 900 | 10 |

Motors on the four smaller models are alike except in size and minor details, all being cast in block with valves to the right and having three crankshaft bearings. The 5-ton motor is pair-cast with valves to the left, but has three crankshaft bearings like the others. Cooling circulation is induced by centrifugal pumps on the four larger models, but on the smallest, thermo-syphon cooling is employed. Finned-tube radiators with vertical tubes are used on all models, the casings being of sheet-metal.

Stromberg carbureters, fed by gravity from tanks beneath the seats are universally employed. Governors may be fitted to all but the 1-tonner, these being centrifugal type, motor-driven. However, except on the 5-tonner, they are not regular equipment, and are charged for extra.

Single ignition is employed on the 1-, 1½- and 2-ton models and dual on the 3½- and 5-tonners, a dry-cell reserve being used in connection with the latter to make starting easier because of the large size of the motors and the difficulty of turning them fast enough for the magneto spark in starting. A Bosch instrument is installed in the 1-tonner, Eisemann supplying those for the others. On all models the spark-advance is controlled by the operator.

Three forms of clutches are to be found in Service trucks. On the 2,000-pounder this member is of the dry multiple-disk form; on the 3,000-, 4,000- and 7,000-pound sizes dry-plate clutches are employed and a leather-faced cone is used for the 5-tonner.

Selective gearsets are used, three speeds being afforded by those in the 1-, 1½- and 2-ton models and four in the 3½- and 5-tonners. Hotchkiss drive is used on the three smaller sizes and modified Hotchkiss drive on the 7,000-pound size. By this is meant that the smaller ones employ their semi-elliptics for both torque and propulsion, while the larger uses radius rods.

Driveshafts on all shaft-driven types are of the single pattern, having two universals. Whipping and whirling is prevented on the 1-tonner by using a large tube for the shaft, which, while no heavier than a solid shaft, is much stiffer for the same strength. The other models have their gearboxes located far enough back to avoid any excessive shaft length and, of course, have full-universalled shafts between their clutches and gearsets.

Pressed steel frames are used on all sizes and all have left steer and center control.

## Nelson & LeMoon Trucks

CHICAGO built, the trucks built by Nelson & Le Moon for the 1916 market are three in number and conventional in construction. Their capacities are 1, 2 and 3 tons, all of the European type. Their general characteristics are:

| | | | |
|---|---|---|---|
| Capacity | 2,000 | 4,000 | 6,000 |
| Price | $1,700 | $2,250 | $2,950 |
| Wheelbase | optional | optional | optional |
| Tires, front | 36x3 | 36x4 | 36x5 |
| rear | 36x4 | 36x7 | 38x5d |
| Drive | worm | worm | worm |

All three are provided with unit power plants comprising Continental motors and Brown-Lipe clutch and gearset units, mounted, in every case, on the rolled

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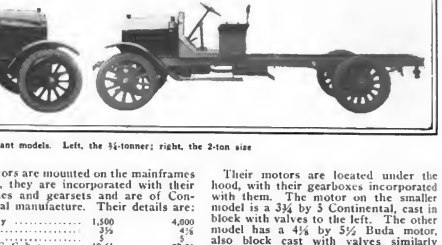

Two new Little Giant models. Left, the ¾-tonner; right, the 2-ton size

channel mainframe direct by three points. The motors are as follows:

| | | | |
|---|---|---|---|
| Capacity | 2,000 | 4,000 | 6,000 |
| Bore | 3¾ | 4⅛ | 4½ |
| Stroke | 5½ | 5½ | 5½ |
| N. A. C. C. h. p. | 22.50 | 27.20 | 32.40 |
| Speed, r. p. m. | 1,000 | 1,000 | 1,000 |
| m. p. h. | 16 | 14 | 12 |

The 1- and 1-tonner have block-cast motors, but that on the 3-tonner is pair-cast, valves being to the left on all. Cooling is arranged by centrifugal pump circulation through flat-tubular radiators in built-up laminated steel cases. Rayfield carbureters are used and the motors have Kramer suction governors.

Bosch ignition is employed on all models.

The clutches are of the dry-multiple-disk type, driving selective gearsets, from which the drive is taken by shafts to the Timken floating worm-driven rear axles which drive through springs. On option, a four-speed gearbox will be fitted to the 3-tonner. Right steer and central levers are found in all sizes.

## Two New European Type Little Giants

WHILE continuing its motor-under-floor chain-driven model, previously produced, the Chicago Pneumatic Tool Co., Chicago, has brought out two new models of ¾ and 2 tons capacity which differ considerably from their predecessors in that their motors are under neat louvred hoods with low, easily-accessible cabs, and that they drive through worm gears:

| | | |
|---|---|---|
| Capacity | 1,500 | 4,000 |
| Price | $1,500 | $2,500 |
| Wheelbase | 120 | 144 |
| Tires, front | 34x4½* | 36x4 |
| rear | 34x3½ | 36x3½d |
| Drive | worm | worm |

*Pneumatic, other tires solid.

Fargo 1-tonner, which hails from Chicago

Motors are mounted on the mainframes direct, they are incorporated with their clutches and gearsets and are of Continental manufacture. Their details are:

| | | |
|---|---|---|
| Capacity | 1,500 | 4,000 |
| Bore | 3⅞ | 4⅛ |
| Stroke | 5 | 5 |
| N. A. C. C. h. p. | 19.61 | 27.20 |
| Speed, r. p. m. | 1,100 | 1,100 |
| m. p. h. | 18 | 15 |

Both motors are similar in being block cast with valves at the right and having three crankshaft bearings. They are both cooled by thermo-syphon circulation through finned-tube radiators in sheet-metal casings.

The Schebler carbureters are fed by gravity from 20-gallon tanks beneath the seats, and are governed by motor-driven centrifugal governors. Eisemann dual ignition with storage battery reserve is used in both models.

The unit power plant on each model comprises a dry-multiple disk clutch and three-speed selective gearset, from which the drive is taken by divided shafts with three universals. Springs take both torque and propulsion. Right steer and left control are found in this chassis, in order to adapt it to export as well as domestic sale.

## 1- and 2-ton Fargos

TWO models of internal-gear-driven trucks are produced by the Fargo Motor Car Co., Chicago. These trucks are very similar in design and are of standard outline. Their features are:

| | | |
|---|---|---|
| Capacity | 2,000 | 4,000 |
| Price | $1,175 | $1,575 |
| Wheelbase | 130 | 156 |
| Tires, front | 36x4 | 36x4 |
| rear | 36x4 | 36x6 |
| Drive | internal gear | |

Their motors are located under the hood, with their gearboxes incorporated with them. The motor on the smaller model is a 3¾ by 5 Continental, cast in block with valves to the left. The other model has a 4⅛ by 5½ Buda motor, also block cast with valves similarly placed. Thermo-syphon cooling is employed on the Continental motor and centrifugal pump circulation on the Buda. Finned-tube radiators are used, with sheet-metal cases.

Rayfield carbureters and Bosch magnetos are employed, the latter acting singly on the 1-tonner and in dual with a battery on the 2-tonner. Neither is equipped with a governor. The clutches on both models are of the dry-multiple-disk type, a selective three-speed gearset being used on the smaller and a progressive on on the larger.

The rear axles are of Russel make, taking torque and propulsion by springs. Both models have left steer and center control.

## Shaft-driven 3½-ton Hall

EITHER chain or worm drive may be had on the 3½-ton model of the truck built by the Lewis-Hall Iron Wks., Detroit. The present series worm-driven Hall is chiefly interesting in that it employs Hotchkiss drive in connection with its Timken worm-driven axle and that either left or right steer with central levers may be had, upon option.

The latter course is followed to adapt the vehicle to export sale. Millimeter tire sizes are also furnished for export.

The truck has a 4½ by 5½ pair-cast motor with valves at the left, which rates at 32.4 N. A. C. C. horsepower. Cooled by centrifugal circulation, it has a vertical finned-tube radiator in a cast aluminum casing. It has a Zenith carbureter and choice of Bosch or Eisemann magnetos in a single system. Spark advance is automatic and the speed is limited by a Kramer suction governor set for 13 miles per hour at 1,025 r. p. m.

The motor power is transmitted through a dry-multiple-disk clutch and progressive sliding gearset having four speeds to the floating type rear axle by a divided shaft with three universals.

Both the motor and the gearset are incorporated in one three-point suspended unit power plant from the rolled-steel mainframe.

## Lighter Troy Trailer

RATED at 1,250 pounds capacity, a new Troy trailer of the four-wheel, non-reversible type has just been produced by the Troy Wagon Wks. Co., Troy, O. The vehicle has a short wheelbase, 70 inches, and a standard 56-inch track. The wheels are of wood, with 36 by 1¼-inch solid rubber tires. They are

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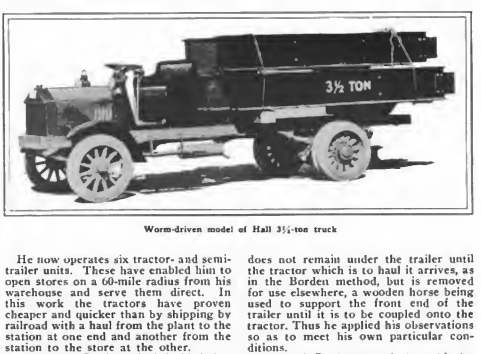
mounted on Timken bearings in Sarven patent hubs, similar to those used on light horse wagons.

While it is of light weight and resembles horse wagons in appearance to some degree, it is designed especially for trailer work, having a spring draw-bar on the front axle, whose spring is so arranged that it is under compression both in forward and reverse directions. The floor is low, too—26 inches—and the vehicle is especially well sprung. Elliptic springs are used behind and semi-elliptics in front. Axles are 1¼-inch square section of solid steel.

The body has a loading space 8 feet long and 35 inches wide. It is constructed of oak and poplar, the floor being oak and oak framing is used on the sides, poplar panel being employed. The height of the piano box panels is 10 inches and above these are 6-inch flare-boards. End gates are fitted on both ends, so that it may be loaded from either end. It is regularly painted green with black striping and varnished over the color. Its price is $125.




Worm-driven model of Hall 3½-ton truck

## He Observes and Applies

(Continued from page 13)

ground-covering ability as compared to the horse. He tried trucks. They were not a success. The reason for their failure was due to the fact that they were held idle for about 2 hours while being loaded, even though there was plenty of room at the loading platform and the waste time in loading had been eliminated.

But Roulston was not to be daunted. He began to look about him. One of the first truck equipments which he observed was that of his next-door neighbor, the Cranford Co., a contracting concern, a description of whose motor vehicles appeared in THE COMMERCIAL VEHICLE of May 1, 1914. The Cranford company uses tractor and semi-trailer outfits, the semi-trailers of which are loaded while the tractors are out with other loaded semi-trailers. By this method the idle loading time of the tractors is practically eliminated.

Roulston observed this at a glance and decided to apply it to his own installation. Accordingly, he purchased three tractors and converted several of his horse wagons into semi-trailers.

This he did by the elimination of the front wheels and fore-carriage and the substitution therefor of the upper half of a Shadbolt fifth-wheel, the lower half of which was carried on the tractor frame. Larger-tired wheels were also fitted and the frame and body reinforced generally to withstand the higher tractor speeds as compared to the horse. These were placed with their rear ends at the loading platform and their front ends supported on wood horses. They were loaded in the late afternoon with goods to be delivered on the day following. In the morning, each tractor backed up under the loaded semi-trailer, which was then let down on the tractor fifth-wheel. After this had been done, the tractor was off on its route within 5 minutes, whereas by the old method the loading would have consumed 2 hours' time.

This saving of loading time made it possible for Roulston's tractors to be in actual motion for more than 70 per cent of the possible working time. This made the tractors a success. Roulston's observation had been keen, his application practical.

He now operates six tractor- and semi-trailer units. These have enabled him to open stores on a 60-mile radius from his warehouse and serve them direct. In this work the tractors have proven cheaper and quicker than by shipping by railroad with a haul from the plant to the station at one end and another from the station to the store at the other.

As soon as Roulston had decided that the use of the semi-trailers and tractors was a success, he began a study of the best method of coupling and uncoupling the two at the loading platform. He first of all observed how others with similar equipment did it. The Cranford company used a steel bent with differential block-and-falls which could be moved along the top of the bent in much the fashion of a trolley. The Borden's Condensed Milk Co., a description of whose tractor equipment appeared in THE COMMERCIAL VEHICLE of June 1, 1914, used two ordinary jacks which were left in place under the forward end of the semi-trailer until the tractor was ready to couple on.

He dismissed the Cranford method because its cost would have been excessive for the nine semi-trailers which he uses and also because the overhead framing would have interfered with a trolley line on the underside of the roof beams parallel with the platform by means of which express trolley cars run alongside the platform from the street. These trolleys bring in all of the freight shipments from the nearby railroad yards.

He departed also from the Borden method and instead of using two jacks per semi-trailer, employs one larger hydraulic jack mounted on a small two-wheeled carriage which may be moved easily from place to place. This jack does not remain under the trailer until the tractor which is to haul it arrives, as in the Borden method, but is removed for use elsewhere, a wooden horse being used to support the front end of the trailer until it is to be coupled onto the tractor. Thus he applied his observations so as to meet his own particular conditions.

Although Roulston worked out his delivery system himself and personally supervised its installation, he finds it impossible to attend to all the details, even though he reaches his office at 8:30 a. m and remains generally until 5 p. m. Accordingly, he has delegated his authority to three lieutenants, each of whom has his own particular work to do. One man buys all the truck and garage supplies and passes orders for parts and various equipment. Another, the shipping clerk, routes the tractors according to the amount of goods to be sent the various stores so that each carries a full load on every trip. The third man, the garage superintendent, is responsible for the mechanical condition of the vehicles and for their being ready each day to do the work laid out for them.

This is Roulston's organization. It has but three heads and each knows just what he is responsible for. In cases of trouble or dissatisfaction from any quarter, Roulston is able to put his finger on the head responsible, according to the nature of the complaint. Several afternoons a week Roulston jumps into his car and is driven to various of his stores. Thus he often meets his tractors unexpectedly on their routes. This enables him to judge how the drivers are operating them. He also gets first-hand information from the managers of the various stores and is thus able to keep his vehicles at a point of high efficiency.

New $125 Troy trailers of 1,250 pounds capacity

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# Accessories for the Truck

## HAISS SELF-FEEDING TRUCK LOADER

Eliminating all hand labor in loading material from the ground, the Haiss wagon loader shown in Fig. 4 is similar in design to other types made by that company except for the use of a feeding conveyor. This consists of a frame with sprockets at each end over which run chains carrying small buckets. The loader proper is backed up to the pile of material to be loaded and the feeding conveyor lowered down onto the pile. The conveyor is driven through sprockets and chains by the same motor which operates the elevating bucket device of the loader proper. It feeds the material into a trough at the base of the elevator from whence it is picked up by the elevator buckets and carried to a chute at the upper end of the elevator. There it drops into the truck body by gravity.

When moving the loader proper from point to point, the conveying device is raised off the ground by means of a drum and cable turned by a hand crank. Also when the conveyor is in such position, the loader may be operated just the same as if the conveyor were not attached.

The loader proper consists of a steel frame carried on two large steel wheels at the rear and two smaller ones at the front. The latter are mounted on a fifth-wheel to provide for the easy manipulation of the device. The elevator extends from a point about 1 foot off the ground at the rear to 12 feet at the front. This height permits a truck to drive under the chute when the loader is in position at the pile to be loaded. The elevating mechanism can be driven either by an electric motor or a gasoline engine, according to the desire of the purchaser. Haiss loaders are manufactured by the George Haiss Mfg. Co., New York City.

## HERO TRUCK FENDER

Designed so that it can be readily applied to any type of motor truck and constructed so as to roll a person along before it or off to one side, the Hero safety fender is made up of a flat U-shaped pipe frame with a series of vertical springs attached to the top and bottom of the frame, these serving to take up the shock of striking a person and to roll him along until the vehicle is stopped. The device is attached to the front spring horns of a vehicle by a clamp and four rods, two on each side. The two upper rods are fixed to the top of the frame and pivoted to the clamp on the spring horn, while the two lower rods are fixed to the clamp. The other ends of the latter are supplied with pins, which are restrained in two slotted bars mounted on the rear side of the frame.

Fig. 1—The Hero motor truck fender. The upper left picture shows the device in its ordinary position and that at the right, its lowered position when it appears that the vehicle is about to strike a person. The lower left illustration shows the method of mounting. The lower right picture shows the button-headed pedal directly below the vehicle brake pedal so that the driver can operate the brake and lower the fender at the same time

Fig. 2—Improved time-study watch, useful for motor truck owners in timing loading and unloading operations

The device may be set in one of two different positions, one up and the other down, as when it appears that the vehicle is about to strike a person. Under ordinary conditions the fender is carried in the up position. It is lowered by the push of the driver's foot on a pedal in the cab which operates through levers to force the pivoted fender bars down and thus the fender itself. The amount of its downward motion is restrained by the pins in the fixed fender bars coming in contact with the tops of the slots in which they operate. When entirely down the fender makes an angle of about 60 degrees with the horizontal, thus having somewhat of a scooping effect. A particular feature of the lowering of the fender is the fact that the driver's pedal is directly below the foot brake pedal of the vehicle, so that the driver can operate the brake and lower the fender at the same time.

The fender is only as wide as the overall length of the front axle from hub cap to hub cap, so that in turning a corner with the fender down the inside wheel projects beyond it. This concession is made in the design of the unit because to make it wide enough to cover the inside wheel on a curve would make it a nuisance in heavy traffic.

The device weighs 50 pounds and is manufactured by the Hero Mfg. Co., Philadelphia, Pa. It is shown in up and down positions as applied to a motor truck in Fig. 1.

## PORTABLE GARAGE PUMP

Designed to supply compressed air for inflating motor vehicle tires in medium- or large-sized garages, the Master portable garage pump, made by the Hartford Machine Screw Co., Hartford, Conn., consists of a two-cylinder air pump driven by ½-horsepower electric motor mounted on a three-wheeled metal truck. Running at its normal speed of 500 r. p. m., the unit will deliver 3 cubic feet of free air per minute, sufficient to inflate a 37 by 5 tire from flat to 90 pounds pressure in 1½ minutes.

No reservoir tank is required, as the pump forces the air directly into the tires. A small expansion chamber is provided to remove all impurities from

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the air and to prevent oil from getting into the inner tubes of the tires.

The unit may be run from the ordinary lighting circuits, 20 feet of wiring being furnished as standard equipment for this purpose. The equipment also includes 20 feet of wire-bound rubber hose with tire pressure gauge attached.

Motors are furnished for 110-volt direct current and 110-volt, single-phase, 60-cycle alternating current as standard, but where necessary, motors can be furnished for 220-volt direct current, 110-volt, 25-cycle or 40-cycle current, or 220-volt, 40- or 60-cycle alternating current. The overall length of the unit is 33 inches and the overall height, 33½ inches. It is shown complete in Fig. 3.

## IMPROVED TIME-STUDY WATCH

Time in loading and unloading operations bears an all-important relation to motor truck efficiency because meanwhile the truck is kept idle. The longer it is idle the smaller its saving becomes as compared to a horse vehicle in the same work. For those desirous of reducing the idle loading and unloading time, the time-study watch shown in Fig. 2 should prove of benefit, both for determining the actual time and for motion study.

The watch is designed to eliminate unnecessary calculations to determine the number of operations which a man can do per day or per hour after the time of one operation has been secured. The

Fig. 3—Portable electrically-driven garage tire pump with two-cylinder air pump, made by the Hartford Machine Screw Co., Hartford, Conn.

two former quantities may be read directly on the watch dials.

The watch differs little from the ordinary timepiece in appearance except for the dial face. There are two main dials, one around the circumference of the watch face and similar to the hour and minute dial of the conventional watch, and another similar to the second dial. Each of these dials have a hand pivoted at their center points.

The circumferential dial is divided decimally into ten parts, each part representing a minute. Each one of these parts is again divided into ten parts, each representing 1/10 minute. Directly beneath each of these divisions as well as the minute marks is a three-figured number which indicates the corresponding number of operations which can be done in an hour or in a 10-hour day, the decimal place in the latter case being placed by the man using the watch. For instance, a man loading a standard-sized package

Fig. 4—The Haiss portable truck loader with self-feeding attachment which eliminates all hand labor in loading material from the ground

into the body of a motor truck takes 1.6 minutes per package. Directly under the division representing 1.6 minutes on the dial is found a figure 375. In 1 hour at this rate, the man could load thirty-seven and one-half packages or 375 in a 10-hour day. Similarly, for other unit times, the hourly and daily averages can be found.

The smaller dial is also divided decimally into ten parts, from zero to thirty. It is used to time operations which take more than 10 minutes, as shown on the large circumferential dial.

The watch is started by pushing a slide on the edge of the case toward the stem. To stop it, it is pushed back to its original position. Both dial handles are brought back to zero by pushing down the crown of the stem. The watch is made by M. J. Silberberg, Peoples Gas building, Chicago.

## NORTHERN TRUCK WINCHES

Designed particularly for application on motor trucks for hauling heavy articles on or off the body or for lifting unwieldy objects, Northern winches are made in sizes from 1,000 to 2,000 pounds capacity. They are made by the Northern Engineering Wks., Detroit, and are designed to be operated from the truck motor through a clutch connection on the propeller shaft.

The winches are of the platform drum-hoist type and are made in both spur-geared and worm-geared form, with all the gears inclosed in each case. The device is usually placed directly aft of the driver's cab and operated by the driver through a lever on one end of the drum shaft.

This type of winch can be applied to any type of truck but is usually recommended for those of heavy capacity. It is shown in Fig. 5, as used in connection with a boom and tackle.

Fig. 5—A Northern winch designed for motor truck use as applied in connection with a boom and tackle for lifting material off the ground into the truck body

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# Men and Makers

**PIERCE-ARROW MOTOR CAR CO.**, Buffalo, N. Y., has just let the contract for the erection of a laboratory and experimental building, 50 by 90 feet, two stories high, at the Elmwood avenue plant adjacent to the New York Central Railroad tracks.

**Thomas B. Jeffery Co.**, Kenosha, Wis., has recently started work on two new factory buildings, each three stories high. The company has recently been working night and day to keep up with increased orders and the new buildings have become necessary in order to give sufficient additional floor area. The company is employing about 2,500 men at the present time, as compared to 1,300 on the payroll a year ago.

**Studebaker Corp.**, Detroit, recently secured a permit for the erection of a steel and concrete addition to its plant at west Jefferson and Clark avenues, to cost approximately $35,000.

**Vim Motor Truck Co.**, Philadelphia, Pa., formerly the Touraine Co., maker of the Vim 1,000-pound delivery car, has started work on its new six-story concrete factory building at Twenty-third and Market streets in that city. It will cost about $750,000 and will be ready for occupancy during the early spring of 1916. It partly covers a plot 200 by 400 feet, and will contain 64,000 square feet of floor, or a total of 384,000 square feet for the entire structure.

**Twin City Four Wheel Drive Co.**, St. Paul, Minn., formerly the Ware Motor Vehicle Co., maker of the Ware four-wheel-driven truck, has begun work on its new factory in that city. The structure will be two stories and basement in height and the foundations will be sufficiently large to permit of the addition of two more stories should occasion demand. The buildings will face 200 feet on University avenue at Pelham street, two blocks from the new Overland plant. It will be ready by March 1, 1916, and is estimated to cost $51,000.

**Diamond-T Motor Truck Co. of New York, Inc.**, 245 west Fifty-fifth street, has recently been formed to handle the sale of Diamond-T motor trucks, made by the Diamond-T Motor Car Co., Chicago, in the territory of New England, New York, eastern Pennsylvania, New Jersey, Delaware, Maryland and the District of Columbia. F. B. Porter and F. W. Dreckkrade are at the head of the new company. Mr. Porter was formerly in charge of the New York City branch of the Chase Motor Truck Co., Syracuse, N. Y.

**Chase Motor Truck Co. of Missouri**, Kansas City, Mo., has recently been formed to handle the sales of Chase trucks in Kansas City and the surrounding territory. The new company will be located at 415 Wyandotte street and will succeed Moss & Metcalf, former Chase dealers.

**Sternberg Motor Truck Co.**, of New York, a branch of the Sterling Motor Truck Co., Milwaukee, Wis., has changed its name to the Sterling Motor Truck Co., of New York, to conform with that of the parent concern. The change in name went into effect on December 9.

**Cott-McKelvey Auto Sales Co.**, Columbus, O., located at 446 north High street, has taken the central Ohio agency for the United States trucks, manufactured by the United States Motor Truck Co., Cincinnati, O.

**D. E. McCann's Sons Co.**, with sales and service quarters on Preble street, Portland, Me., has taken the southern Maine agency for Commerce trucks.

**Imperial Wheel Wks.**, Flint, Mich., is building additions to its plant which are expected to enable it to increase its output by 50 per cent before the first of the year. New structures are being added to both the main factory and the dry kilns.

**Republic Brass & Bronze Co.**, Pontiac, Mich., was recently formed in that city with a capital stock of $25,000, of which $13,000 has already been paid in. The new company has purchased the plant of the Pontiac Motor Castings Co., and will remodel it at once. All kinds of brass, bronze and aluminum castings will be made.

**Wisconsin Machinery & Mfg. Co.**, Milwaukee, Wis., is making a specialty of pistons for motor vehicle gasoline engines. It is also doing a great deal of machine work on large quantities of aluminum, cast iron and steel parts of various kinds for the motor vehicle industry.

**Lake Breeze Motor Co.**, recently organized to build gasoline motors for motor vehicles, has completed arrangements with the Chamber of Commerce of Oshkosh, Wis., where the company will erect its manufacturing plant. The removal of the shops from Chicago to Oshkosh will commence at once and the new plant will be in operation about April 15, 1916.

**Jaeschke Bros. Foundry Co.**, Milwaukee, Wis., is erecting a new foundry and pattern shop at Cawker place, Thirtieth street and the Milwaukee railroad tracks. Both the foundry and pattern shop will be housed in one building, to be of brick construction, 120 by 150 feet, one story in height, estimated to cost $20,000.

**Housel & Bair**, Williamsport, Pa., makers of motor vehicle clutches, last week took out a permit for the erection of a factory building near their present site on First street. The new structure will be one story high, of brick.

The tie-up of approximately 65,000 loaded freight cars in and around New York and other Atlantic ports, due to a lack of ships to carry goods abroad, has caused such a shortage of box cars that the Packard Motor Car Co., Detroit, has been forced to ship its motor trucks on ordinary flat cars. As shown in the above view to the left, two trucks make a flat-car load. These are placed with their fronts abutting at the center of the car. In this position, they are securely blocked and anchored by means of heavy timbering. Then, as shown at the right, they are provided with special overcoats consisting of lumber frames with sheathings of waterproof oilcloth. The loading platforms of the Packard company permit the handling of thirty-two trucks, or sixteen flat cars, at the same time

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and will cost about $5,000. The firm is said to have enough orders to keep it busy for 1½ years.

**Firestone Tire & Rubber Co.,** Akron, O., has just taken out permits for the erection of four new factory additions. Two of the new structures will be five stories high and the other two one story each. The cost of the new buildings is estimated at $75,000.

**Firestone Tire & Rubber Co.,** Akron, O., has recently purchased the structure at the corner of Bedford avenue and Sterling place, Brooklyn, N. Y., now occupied by the Ford Motor Co. The Brooklyn Firestone branch will be opened in the building on January 1.

**Kelly-Springfield Tire Co.,** New York City, is at present working its Akron, O., plant on a 24-hour-per-day schedule. About 1,500 pneumatic tires are being turned out daily and it is expected that more than 400 solid tires per day will be added to the output before the first of the year.

**Schafer-Bowlus Tire & Rubber Co.,** Toledo, O., has arranged to handle Kelly-Springfield tires exclusively in Toledo and the surrounding counties. Mr. Shafer was formerly connected with the Cleveland, O., branch of the Kelly-Springfield Tire Co., New York City.

**Pierce Speed Controller Co.,** Anderson, Ind., is planning to move into its new plant shortly after December 15. The company is now working day and night shifts in its present plant. The output will be greatly increased as soon as the new factory is in full operation.

**Sparks-Withington Co.,** Jackson, Mich., manufacturer of Sparton warning signals for motor vehicles, is erecting a one-story building, 40 by 90 feet, for a shipping room. A two-story structure, 40 by 90 feet, will also be erected for use as a washroom and locker room. About 500 men are on the payroll at the present time, working on two shifts.

**Burd High Compression Ring Co.,** Rockford, Ill., has moved into its new factory at the corner of Twenty-third avenue and Tenth street, that city. The new plant is 190 by 129 feet, with an available manufacturing floor space of 19,000 square feet. It is capable of turning out 25,000 pistons rings per day with a force of 250 men.

**J. B. D. Carbureter Co.,** Milwaukee, Wis., has just been organized for the manufacture of motor carbureters and other motor vehicle accessories by J. B. Drahonovsky, founder of the Resilient Wheel Mfg. Co., also of Milwaukee. The new concern will occupy quarters with the Resilient Wheel company.

**Chicago Nut Co.,** Chicago, manufacturer of brass nuts, has just awarded the contract for the construction of a new two-story factory on west Twentieth street, Chicago, to cost $38,000.

**E. M. Elliott,** general manager of the United Motor Truck Co., Grand Rapids, Mich., sailed from this country on December 11 for Europe, where he will represent United trucks in England, France, Russia and Australia. He will observe the large number of United trucks in use on the continent with a view to making them better adaptable, if possible, for European service. Mr. Elliott is succeeded in this country as general manager of the United company by George F. Sweet. Mr. Sweet is from Detroit, where he has been engaged in the manufacturing business for several years.

**Paul Moore** has recently become advertising manager of the Service Motor Truck Co., Wabash, Ind. Mr. Moore was formerly advertising manager for the Weis Container Corp., Monroe, Mich., and before that was with the National Cash Register Co., Dayton, O., and the Shenango Pottery Co., New Castle, Pa., in advertising capacities.

**Concord, Mass., which became famous during revolutionary days, recently was the scene of another revolution, though a bloodless one. Some time ago the electric lighting of the streets was taken over by the city and the entire lighting system brought strictly up to date. Horses, formerly used for the work in connection with this department, were discarded and their places taken by two electrics, of G. M. C. make, provided with Gould batteries. One of these trucks is used for patrolling and the other for line work. It is the latter that is shown above. There are about 65 miles of streets in the town, all electrically lighted, and this one truck serves to convey men, tools and materials throughout it. The trucks are charged at the power plant with municipal current**

**Vincent Link,** formerly with the Packard Motor Car Co., Detroit, has been appointed designing engineer of the J. C. Wilson Co., Detroit, manufacturer of the Wilson truck.

**Wilbur C. Johnson,** vice president and general sales manager of the Waverley Co., Indianapolis, Ind., was recently elected secretary of the Electric Vehicle Manufacturers' Assn., succeeding E. P. Chalfant, resigned. Mr. Chalfant is now eastern manager of the Anderson Electric Car Co., Detroit.

**A. C. Harrington,** for 13 years a member of the sales force of the Packard Motor Co., Detroit, has recently been appointed sales manager of the Packard Motor Car Co. of New York, New York City.

**Henry Jossman** was recently appointed sales manager for the Columbia Truck & Trailer Co., formerly of Kalamazoo, Mich., but now located in Pontiac, Mich.

**J. D. Cotton** recently accepted the position of advertising manager for the Four Wheel Drive Auto Co., Clintonville, Wis.

**H. H. Murden,** general manager of the Knickerbocker Motor Truck Mfg. Co., New York City, has resigned. The resignation will take effect on December 31.

**Reide B. Romig** was recently elected general sales manager of the Kearns Motor Truck Co., Beavertown, Pa.

**George Kelly,** formerly with the Baker R. & L. Co., Cleveland, O., has recently joined the truck sales department of the White Co., Cleveland, O.

**Paul D. Donaldson** was recently transferred from the New York City branch of the Chase Motor Truck Co. Syracuse, N. Y., to the sales force of the same company at the Philadelphia, Pa., branch.

**John F. Plummer,** manager of the New York City branch of the Locomobile Co. of America, Bridgeport, Conn., resigned his position with that company on December 1. His plans for the future have not yet been announced. Mr. Plummer had been with the Locomobile company for 16 years. He was manager of the Locomobile branch in Chicago at one time and opened the Locomobile branch in Philadelphia. He also made a trip to the Orient in the interests of his company.

**J. A. Nevins** has recently joined the selling staff of the Chase Motor Truck Sales Co., Chicago.

**Eugene L. Caton** has recently been appointed agent for Lippard-Stewart trucks in Worcester, Mass., and the surrounding territory.

**F. H. Poor,** general manager of the S. K. F. Ball Bearing Co., of New York, since 1909, has resigned and opened an office of his own at 30 Church street, New York City. It is expected that the resignation is only temporary, however, as the new S. K. F. Ball Bearing Co. of Connecticut is planning to absorb the old New York importing company, when it is expected that Mr. Poor will again become identified with the S. K. F. interests.

**Donald F. Kennedy,** manufacturers' agent of Detroit, has recently arranged to handle the sales of the Hammond Steel Forging Co., Inc., Syracuse, N. Y., in the western part of the United States. The Hammond company manufactures hammered steel bars, die blocks and special forgings. The present office of the Hammond company in the Dime Savings Bank building will be discontinued.

**L. R. Remington,** formerly in charge of the Atlanta, Ga., branch of the Hyatt Roller Bearing Co., Detroit, has been made service manager at the Chicago branch of the same company, succeeding J. R. Phillips.

**R. B. Campbell,** recently manager of the service branch of the Hyatt Roller Bearing Co. in Detroit, has been transferred to the branch of the same company in Atlanta, Ga. He will be succeeded at Detroit by J. W. Taylor, a new man in the Hyatt organization.

**J. E. Argus,** manager of the mechanical goods department of the Pacific Coast branch of the Goodyear Tire & Rubber Co., Akron, O., has recently been promoted to district manager of the same company for the Pacific Coast territory. He succeeds M. E. Morris, who has been

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placed in the sales department of the company at the plant in Akron, O.

**R. P. Cartmell,** Los Angeles, Cal., has been appointed manager of the southern California branch of the Kelly-Springfield Tire Co., New York City, succeeding C. A. Jessup, who has been transferred to the Cleveland, O., branch of the same company.

**E. A. Cassidy** will sever his connection with the H. W. Johns-Manville Co., New York City, on January 1, 1916, to become president of the Edward A. Cassidy Co. The latter concern is a selling organization and will market the entire products of several concerns manufacturing motor vehicle accessories. It will have its headquarters in New York City, with branches in Chicago, Detroit, Boston and San Francisco. Mr. Cassidy was general manager of the motor vehicle accessory department of the H. W. Johns-Manville company.

**E. E. Schwartzkopf** has recently joined the sales organization of the Longuemare Carbureter Co., New York City. He was formerly sales manager for Gray & Davis, Boston, Mass.

**Charles Johnson,** formerly special representative of the Lovell-McConnell Mfg. Co., Newark, N. J., in Detroit, has been appointed factory equipment manager of the same concern for the entire United States. All the factory equipment business of the company will hereafter be transacted through the Detroit branch, where Mr. Johnson will make his headquarters.

**Tyler Bros.,** Villisca, Ia., are building a garage to house the ten motor trucks used by them in their ice cream manufacturing business.

**Standard Motor Truck Catalog,** describing and picturing the complete line of Standard worm-driven and chain-driven trucks manufactured by the Standard Motor Truck Co., Detroit, including the new 2-tonner, is an especially well-arranged 52-page booklet which gives besides the specifications of each model, many illustrations of Standard trucks in actual service in many kinds of work. The component parts of Standard trucks are also shown in detail with short technical descriptions of each. The book is published on glazed paper, 8 by 10½ inches, with a blue cover and embossed white lettering.

**Little Giant Truck Catalog No. 222,** dated November 1, 1915, recently published by the Chicago Pneumatic Tool Co., Chicago, is an elaborate twenty-eight page booklet picturing the Little Giant 1- and 1½-ton trucks in actual service besides giving chassis views and specifications. A list of the agents and dealers for Little Giant trucks, both domestic and foreign, is also given, together with testimonial letters from many users all over the country. Body dimensions for each model are also given. The booklet is published on heavy gloss paper with a blue cover with gold letters. It is 9 by 12 inches. It is to be noted that no mention is made of the new worm-driven model announced some months ago.

**The Denby Course in Salesmanship,** recently instituted by the Denby Motor Truck Co., Detroit, is a free correspondence course of thirty-six lessons designed to aid the drivers of Denby trucks in all lines of business so as to a better understanding of their vehicles. It is pointed out that a driver of a truck is selling his services to his employer and that if he understands his vehicle more thoroughly he will be able to render a better service and therefore obtain a better compensation for his work. All owners or users of Denby trucks are entitled to the enrollment of one man in the course for each truck they own or operate. Each lesson is sent by the Denby company to all of the students enrolled, together with a list of questions to be answered and sheets on which the answers are to be written. These are inclosed in a self-addressed envelope sent with the lesson and returned to the Denby company, where a special staff corrects the answers and rates them. Students who do not seem to grasp the questions or give incorrect answers are aided from time to time by special help, in the same manner as are the students of correspondence schools for law or engineering. A prize of $1,000 will be awarded to the student who shows the greatest general efficiency during the entire course. In addition, $2,000 will be divided into prizes of from $10 to $250 for special monthly and quarterly awards.

**"Methods of Examination of Bituminous Road Materials,"** a book published by the United States Department of Agriculture for several years past, and which has been extensively used as a manual and handbook by engineers and chemists, has been revised and amplified by specialists in the department and has just been issued in new form as Bulletin No. 314. The booklet has forty-nine pages wherein is presented the methods now in use by the Office of Public Roads and Rural Engineering of the department. These are described in as non-technical manner as possible, so that with a little practice and proper equipment, any engineer or chemist may make an adequate examination of bituminous road material. The various tests are described in detail and illustrations of practically all of the apparatus required are given. Modifications in the penetration test; in the determination of fixed carbon and in the determination of paraffine scale are also given. New methods have also been substituted for the former distillation tests and for the determination of voids in the mineral aggregate.

**Special Traveling Agent, Department of Commerce,** Stanley H. Rose, is creating great interest in his trip throughout the United States for the Bureau of Foreign and Domestic Commerce as an expert export trade adviser. He recently spent 3 days in Springfield, O., where he had many conferences with business men and representatives of manufacturing plants as to the best methods to be pursued to increase American exports. From Springfield, Mr. Rose went to Columbus, O., and will then proceed to Lincoln, and Omaha, Neb., Des Moines, Davenport, and Burlington, Ia., St. Louis, Mo., Louisville, Ky., Cincinnati, and Marietta, O., Johnstown, and Reading, Pa., to the New York office of the bureau, which he will reach on December 24, 1915. Early in 1916, he will begin another tour to other business centers which he has not visited as yet. In the summer of 1915, he visited Baltimore, Md., New York City, Albany, Buffalo, Rochester, N. Y., Fairmont, W. Va., Indianapolis, Ind., Chicago, Kalamazoo, Grand Rapids and Detroit, Mich., and Toledo, O.

**"Foreign Markets for Motor Vehicles"** is the title of a 144-page book issued by the Department of Commerce & Labor, United States Bureau of Manufactures, Washington, D. C., which presents a detailed review of conditions in the motor vehicle industry and trade in foreign countries. The book should prove of material assistance to American manufacturers both in holding markets already attained and in extending their export business to new fields. The text is well indexed and takes up in order the industry and trade conditions in North America, including Canada, New Foundland and Mexico; Central America; South America; Europe; Asia; Africa and Oceania. It also publishes a list of catalogs and other publications which accompanied the reports of the consuls of the various countries from which the book was prepared. These are on file in the Bureau of Manufactures and will be loaned to American manufacturers of motor vehicles interested in the export trade. The reports are also on file in manuscript form and are available for the inspection of interested American motor vehicle manufacturers.

**If You Want to Sell Trucks in Porto Rico,** you may obtain any desired information regarding trade conditions, names of merchants, dealers, etc., from the Insular Government Free Bureau of Information, San Juan, P. R. Letters should be addressed to G. F. Correa, chief of the bureau. The information is given gratis

## Commercial Motor Vehicle Agencies Recently Established Throughout the Country

| | | |
|---|---|---|
| Wilmington, Del. | Chase | Newark Garage & Electric Co |
| Hartford, Conn. | Commercet | R. L. McGurk |
| Baltimore, Md. | Kisselkar | Monumental Motor Car Co. |
| Baltimore, Md. | Kisselkar | S. W. Marcus |
| Earlville, Ia. | Kisselkar | P. M. Cloud |
| Fond du Lac, Wis. | Kisselkar | Dallman-Cooper Supply Co |
| Fresno, Cal. | Kisselkar | Collins Bros. |
| Georgetown, Ga. | Kisselkar | J. E. Gibson |
| Lynn, Mass. | Kisselkar | Phillips Street Garage |
| Methuen, Mass. | Kisselkar | Stuart P. Warne |
| North Liberty, Ia. | Kisselkar | Julius Kohl |
| Paris, France | Kisselkar | Joseph Fluxman, McMahon |
| Springfield, Mo. | Kisselkar | Horst & Keller |
| Washington, D. C. | Kisselkar | Henderson-Rowe Auto Co. |
| Bartlesville, Okla. | Koehler | A. R. McKnight |
| Burlington, Vt. | Koehler | E. A. Brodie |
| Harrisburg, Pa. | Koehler | Paul D. Messner |
| Hudson, N. Y. | Koehler | Warren Street Garage |
| Lancaster, Pa. | Koehler | J. M. Binkley |
| London, Eng. | Koehler | Whiting 1915 Ltd. |
| McKees Rock, Pa. | Koehler | Bert Noble Motor Car Co |
| Nashville, Ind. | Koehler | G. C. Dave |
| Trenton, N. J. | Koehler | Louis W. Reeder |
| Ticla, Col. | Koehler | Vestal & Tetre |
| Washington, D. C. | Koehler | Hatfield & Palmer Co |
| Worcester, Mass. | Lippard-Stewart | E. L. Caton |
| Tacoma, Wash. | Mack | Commercial Garage |
| Cincinnati, O. | Mogul | Campbell Bros. Auto Co |
| Spokane, Wash. | Republic | A. A. Williams |
| Tacoma, Wash. | Sauter | Commercial Garage |
| Hartford, Conn. | Stewart | B. L. McGurk |
| Albany, N. Y. | Vim | Tri-City Motor Co |
| Altoona, Pa. | Vim | Altoona Garford Co |
| Beaver Falls, Pa. | Vim | B. O. Fair |
| Detroit | Vim | McKenney-Devlin Co. |
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| St. Joseph, Mich. | Vim | Louis S. Schultz |
| Zanesville, O. | Vim | H. M. Schubach |

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# WHITE TRUCKS

## *Awarded the* GRAND PRIZE

## BY THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION AT SAN FRANCISCO

### THE ONLY GRAND PRIZE—THE HIGHEST AWARD FOR MOTOR TRUCKS

Was conferred upon White Trucks by the Superior Jury of Award, as officially announced by the Secretary of the Jury under date of August Second.

This is the ONLY GRAND PRIZE received by any motor truck at the Panama-Pacific International Exposition.

This decision of the Superior Jury of Award reflects the opinion of the largest users of motor trucks throughout the world—and is in accordance with the actual service results of motor truck experience. The points of merit upon which the Grand Prize is awarded are identical with those that have determined the selection of White Trucks by America's foremost firms in every line of business.

White supremacy in the motor truck industry is thus recognized by the highest award that can be bestowed by the greatest exposition the world has ever known—just as this supremacy has been recognized by motor truck users for many years.

### REGARDING OTHER CLAIMS

The decision of the Superior Jury is final in the matter of Exposition awards. Hence any announcements of other motor truck manufacturers, claiming to have received the Grand Prize and Highest Award for motor trucks at the Panama-Pacific International Exposition, are automatically denied by this decision of the Superior Jury of Award.

THE WHITE COMPANY
CLEVELAND

*Largest Manufacturers of Commercial Motor Vehicles in America*




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## The Long Distance Electric

In all problems of heavy service electricity is the most dependable, economical, and satisfactory power. **Atlantic** Electric Trucks are built in ½, 1, 2, 3½ and 5-ton models. Guaranteed to give 15% more mileage than any other electric truck of equal capacity and same equipment.

Hundreds of users unhesitatingly endorse the known superiority of Atlantic Long Distance Electric Trucks. Our new models have every proven safety factor in construction; modern steering apparatus, allowing driver extreme latitude and flexibility in traffic, maximum traction, smoother rolling, scientific load suspension, etc. Every truck carries with it a guarantee of faithful performance, adequate service, and mileage plus beyond your requirements.

The experience of our experts in handling delivery problems will be of value to you. Let us know your requirements. Our recommendations entails no obligation.

**Atlantic Electric Vehicle Co.**
**Vanderbilt Bldg., New York**
**Main Office and Factory, Newark, New Jersey**

The ideal vehicle for the man with a heavy hauling problem

## The Standard Tractor

Model C 6-ton Model D 10-ton

A real tractor (not a modified motor truck) handling its load at the cost of a 3- or 5-ton motor truck.

Economical of gas, oil, and tires. ***One 6-ton model has run 12,000 miles on its original tires and these tires are still good for 4000 miles more.***

A high class product, standardized throughout. Quickly attached or detached to any type of body 6-ton model turns easily in 25 feet, 10-ton in 29 feet.

**Some Open Territory for Responsible Agents**

**STANDARD TRACTOR CO.,** 120 Waverly Ave. Brooklyn, N. Y.


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NEVER-SKID
FOR MOTOR TRUCKS
Is Not An Experiment

**Be Prepared**
for emergencies and equip with the most practical device on the market.

Does not injure tires. Quickly attached and detached. A set should be part of the equipment of every truck.

Used by U. S. Government, brewers and motor truck manufacturers throughout the U. S. and Canada.

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Quality of manufacture is impossible without organization.
Second to quality in importance and equally as dependant upon organization is promptness in deliveries.
WYMAN & GORDON organization is and has been for years, trained to the highest standard of efficiency in both these factors—factors which insure you in dealing with us.
Right now while America is looked to to supply the bulk of the world's motor vehicle requirements, the WYMAN & GORDON organization should take on a new significance in your estimation.

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Worcester, Mass.
Cleveland Detroit

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are made by specialists in a modern fire-proof factory. All materials used are chosen for quality regardless of cost.

Our aim is dependability of service and our success in this is shown by the use of our chains on the leading makes of trucks throughout the country.

Send for our booklet giving sizes and lengths of "Whitney" Chains required for chain-driven motor vehicles.

**The Whitney Mfg. Co.**
**Hartford, Conn.**

*Chains—Keys—Hand Milling Machines*

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## Double Duty Trucks

—once put in service—always remain in service.

Whatever your business may be there is a SOUTH BEND DOUBLE DUTY TRUCK that will give you the utmost efficiency and satisfaction.

***Wisconsin motors, Warner transmission, Sheldon axles, Ross steering gear, Bosch ignition. Either chain or worm drive.***

SOUTH BEND DOUBLE DUTY FIRE APPARATUS in all cases more than performs its duty.

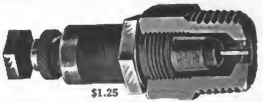
Attractive Dealer Proposition. Write us at once.

**South Bend Motor Car Works**
**SOUTH BEND, IND.**

COMET AND SOOTLESS
## SPARK PLUGS
ARE THE BEST

BECAUSE—1. They are the strongest made; 2. They are absolutely indestructible; 3. One Comet or Sootless will outlast four of any cheap porcelain or mica washer plug made; 4. They are absolutely compression-tight. *Safe, Sure and Reliable. For sale by all dealers.*

Manufactured by **OAKES & DOW CO., 15 Chardon St., BOSTON, MASS.**



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The ignition that is used by the world's most renowned Motor Trucks because it is the most reliable and efficient.

Be Satisfied Specify Bosch

**Bosch Magneto Co.**
203 West 46th St., New York

# U. S. MOTOR TRUCKS

—have won the confidence of their owners throughout the world by 5 years of matchless performance, service and durability.

RELIABLE DEALERS WANTED

The Agency Is a Valuable Asset

Capacity
2 Ton
2½ Ton
3 Ton
4 Ton

If you are considering taking on an agency, or should be dissatisfied with present arrangements, WRITE US. Our proposition is a money-maker. Address Contract Dept. D.

**THE UNITED STATES MOTOR TRUCK CO., Cincinnati, Ohio**

# FRAMES

THE PARISH & BINGHAM CO
CLEVELAND OHIO

Our entire engineering force is at your disposal.



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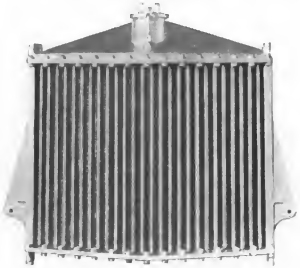
## "Always on the Job"—Because All the Parts Are STANDARDIZED and Made by STANDARD MAKERS for a Standard Truck

which includes a standard motor—CONTINENTAL; standard axles—TIMKEN; standard worm drive—DAVID-BROWN; standard steering gear—GEMMER; standard bearings throughout—TIMKEN; everything standard, including the name and price, combined to give you that much sought "standardization"—with accessible interchangeable units which already bear the stamp of public approval.

DEALERS: Now is your opportunity to secure the most liberal agency proposition ever offered. You take no chances with the leader of standardized motor trucks.

**Standard Motor Truck Co., Detroit, Mich.**

## "RADIATOR INSURANCE"

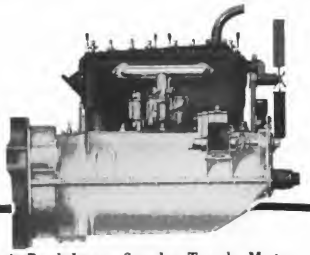


Seamless Helical Tube Cooling Sections are guaranteed for the life of the motor on which they are installed. Helical Tube construction passes the most critical requirements of foreign and domestic engineers.

**Manufactured Only By**

**Rome-Turney Radiator Company**

**Rome, N. Y.**



## A Real Long Stroke Truck Motor

**Wisconsin**

CONSISTENT

Type TU — 4 in. bore, 6 in. stroke.
Type UU — 4¼ in. bore, 6 in. stroke
Cylinders interchangeable.

Note these features.

CYLINDERS—Cast en bloc.
CRANKSHAFT—Four bearing, chrome nickel steel, 2 in. diameter
VALVES—Rich Tungsten steel.
CONNECTING-ROD BEARINGS—3 in. long, 2 in. diameter
BEARINGS—Bronze, Babbitt metal lined
CAM SHAFT—One piece, cams integral.
OILING SYSTEM—Force feed holes crankshaft.
3 POINT SUSPENSION

Write today for detailed specifications and illustrations.

WISCONSIN MOTOR MFG. CO., Big Twin Single MILWAUKEE, WIS., U. S. A.

# MODERN 1915

## GET IN LINE

With your co-operation, we are able to supply you with just the truck that will give the most satisfactory and profitable results in your business—Chain or Worm drive models.

**Model "H" 1½ Ton Chain Drive. Model "L" 1 Ton Worm Drive**
**Model "M" 1½ Ton Worm Drive. Model "P" 2 Ton Chain Drive**

**The Bowling Green Motor Truck Co., Bowling Green, Ohio**

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**BIGGEST MOTOR TRUCK VALUE ON THE MARKET**

## The Gramm-Bernstein Truck

is in a class by itself when it comes to mechanical perfection, ease of operation, and freedom from that ever troublesome repair bill.

Figure on GRAMM-BERNSTEIN equipment and you will have the solution of your hauling problem.

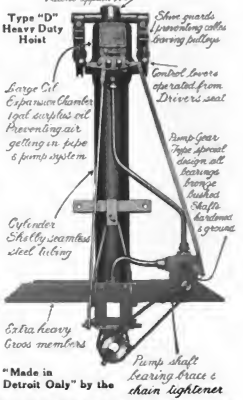
GRAMM-BERNSTEIN Motor Trucks embody in their design our own wonderful non-gear-stripping transmission, worm gear rear axle and self adjusting clutch.

**THE GRAMM-BERNSTEIN CO.**

Dept. B1 Lima, Ohio

## The Wood Hydraulic Hoist

SOLVES THE DUMPING PROBLEM FOR MOTOR DUMP TRUCKS

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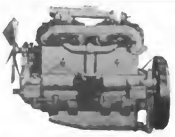
**WOOD HYDRAULIC HOIST & BODY CO., Detroit, Mich.**

Successors to WOOD HYDRAULIC HOIST CO., St. Paul, Minn.



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BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

**BEAVER MFG. COMPANY**

Milwaukee Wisconsin




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One of six Jeffery Quads in the service of the United States Army Signal Corps. This is the most powerful portable wireless station in the world. The Jeffery Quad drives, brakes and steers on all four wheels.

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Main Office and Works, Kenosha, Wisconsin

# DON'T

throw your old bearings away just because they are worn or broken.

We regrind the raceways (without drawing the temper) insert new balls and retainer AT about one-fifth the cost of a new bearing.

Any broken or worn bearing can be exchanged at any of our service stations, for reground bearings of any type or make, which are guaranteed equal to new.

These stations also carry complete stocks of New Single Row Annular, Thrust, NEW DOUBLE Row and Radax Bearings.

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CONSTANT-DEPENDABLE-SERVICE
PITTSBURGH MODEL ENGINE COMPANY
MODEL MOTORS
PITTSBURGH PA.

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# HEAT TREATING

*The True Efficiency in the "Lavine" Steering Gear*

**A Gear With a Worm and Split Nut**

Not the usual worm and pinion device.

Split nut combination with trunnion gives double strength.

Each and every working part heat-treated, pack hardened, pot cooled.

Treatment effected by men expert in the science of metals and annealing.

*It is Lavine thoroughness which gives security*

*Write for Catalog and Data Sheets*

**Lavine Gear Co., Racine, Wis.**

## Combined Side and Rear Delivery
### With Gravity Pitch Built In

Introducing our newest patent coal body with combined side and rear delivery. As pictured, body has gravity pitch built in. Elevates by hand 2½ feet. Load can be delivered in 4 minutes. Truck shown is 3½-ton Hurlburt. This is the most efficient and practical device we have ever built—the last word in coal body construction.

We build bodies up to 10-ton capacity, to your specifications and to meet your special needs. Side, rear, or combined side and rear delivery—hand or power hoist. Can be shipped anywhere.

Write for photo and particulars regarding this new body.

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# Cotta "Short Series" Transmission

## Suitable for Any Drive

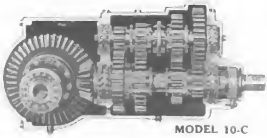
—is manufactured in various sizes and styles of case, for either double side chain or shaft drive. For special requirements, in quantities.

Strong, and rigidly built of best materials. All parts standard, to micrometer measurements.

Next time insist on *Cotta "Short Series" Transmission* for economy.

**COTTA GEAR CO.**

720-730 Sixth Street Rockford, Illinois



MODEL 10-C

# Firestone
## Truck Tires

Every Firestone is a masterpiece of Toughness and Resiliency, and the right tire for its work. Firestone S. A. E. Removable Rim Equipment enables any driver to change tires in a few minutes. No delays. No truck lay-off.

Firestone Pneumatic Tires applied under the modern pressure Light Weight Wheels are a Profitable Combination. Firestone tires are on near-gas for simple and low prices.

**Firestone Tire and Rubber Co.**

*"America's Largest Exclusive Tire and Rim Makers"*

Akron, Ohio

Branches and Dealers Everywhere

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GENERAL MOTORS COMPANY
TRUCKS

*Electric* *Gasoline*

**With your cooperation we are able to supply the type of truck, gasoline or electric, that will give the most satisfactory and profitable results in your business.**

**Send for our catalogues today.**

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*One of the Units of General Motors Co.*
**Pontiac, Michigan**
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## That's Real Service

said one of our customers.

Yes! and we can give *your* felt orders the same prompt attention if you'll let us.

Why not try doing business with an A-1 house and get "what you want when you want it"?

Dependable goods only; accuracy in manufacture, prompt service and attractive prices are the watchwords of our business.

***"If it's made of felt, ask Booth"***

*Write—Wire or Phone*

## The Booth Felt Co., Inc.

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116-118 South Fifth Ave., Chicago, Ill.
12th St. and Grand Trunk R. R., Detroit, Mich., 'Phone, Market 5804

**Baker Electric Trucks** 1, 2, 3½, 5-ton Sizes

*Equipped with bodies built to order for every trucking need*

This 2-ton Baker truck is one of a fleet.

Baker Electric Trucks are dependable for hard continuous winter service. Selected by many substantial companies for their city work.

The Reasons and our Catalog upon request.

Manufactured by
THE BAKER R & L CO.
Cleveland, Ohio

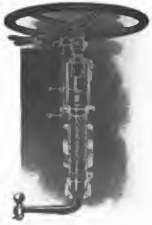
**STANDARD**

**on good motor truck construction**

**INVESTIGATE**

**Fore and Aft**

# STEERING GEARS



**CROSS TYPE**

**Enormous bearing surfaces**
**Perfect Lubrication**
**Best material thruout**
**Finest workmanship**

**Ross Gear & Tool Co.**
790 Heath Street
Lafayette Indiana



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TRUCKS

4,000 IN DAILY SERVICE and sales this year 100% greater than for the entire year of 1914.

Why? Because MACK TRUCKS are of the right quality and capacities to meet all requirements.

*Send for samples of Dealer Helps*

INTERNATIONAL MOTOR COMPANY

West End Avenue and 64th St., New York

Export Department, 24 State St., New York

# Under Control

Jail should await the truck owner who does not **know** that the linings of his brakes are in perfect condition.

A heavy truck with bad brakes is a lawless menace.

**Thermoid**
**HYDRAULIC COMPRESSED**
**Brake Lining - 100%**

100% because it's brake lining clear through, not merely on the surface. It will hold though worn paper thin.

Thermoid is cured under hydraulic pressure into a solid substance of uniform density. It is the best brake lining you can buy.

Write for facts and samples.

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Trenton, N. J.

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Our Guarantee: THERMOID will make good or we will.

COVERT COVERT COVERT

TRANSMISSIONS

# Of the Highest Quality

Covert Transmissions are the result of many years' successful transmission building—today they are recognized as the best—not only in point of service and durability but also in regard to quietness and all around efficiency.

Made in various models for different sizes and types of cars—Covert Transmissions will free you from transmission troubles. Let us show you how they fit your construction.

**Covert Motor Vehicle Co.**

SALES OFFICE Detroit, Mich.

FACTORY Lockport, N. Y.

# The Highest Efficiency

is attained in this worm-drive truck by powerful construction according to a correct four-wheel-drive principle which distributes and equalizes the driving stresses.

**MORTON TRUCKS, 1½ to 6 Tons Capacity**

in both regular type and four-wheel-drive are built to take hard usage and show permanent economy.

This serviceability is due to the thorough design of the vehicle as a whole and the use of the better standard parts. Study the specifications!

Write us for open territory and get into this four-wheel-drive business.

**Morton Truck & Tractor Co.**
HARRISBURG, PA.




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**Almost any magneto can be sold to somebody,**
but when the

# EISEMANN
MAGNETOS

are adopted as standard equipment by the great ignition experts of

## 108 Manufacturers

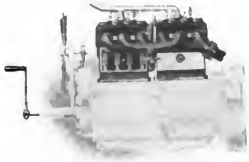
—the largest in the country—including

**72 Trucks**
**11 Pleasure Cars**
**25 Miscellaneous**
Tractors, Mining Machinery, Stationary Engines, Gasoline Locomotives, etc.,

***There Must be a Reason!***

**The Eisemann Magneto Co.**
Sales and General Offices:
32-33rd Street, Brooklyn, N. Y.

New York, 245 West 55th Street
Indianapolis, Ind., 415-417 N. Capitol Ave
Detroit, Mich., 808 Woodward Ave



Model D. 4¾ x 6

**NORTH AMERICAN**
# MOTORS

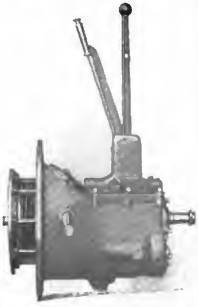
**This model is designed especially for 3 and 4-ton vehicles and for power and pull the market knows no more powerful, at the same time, economical power plant.**
**We solicit the opportunity of putting this motor on test under the observation of engineers and manufacturers who are in the market for a motor of supreme efficiency.**

**North American Motor Co.**
Pottstown, Pa.

# FULLER
**Unit**
## TRANSMISSIONS

**Model "T U" ¾-1 Ton**

**Model "T U 2" 1½-2 Ton**



*Particulars sent on request*

**FULLER & SONS MFG. CO.**
Kalamazoo, Mich.

# Russel
## Internal Gear Drive Axles

## Proof of S rviceability

Every one of the Internal Gear Rear Drive Axles which we have sold has been and is now giving satisfactory uniform service under trucks.

The most exacting experience with trucks using the RUSSEL Internal Gear Axle has proven beyond question the correctness of this principle and of RUSSEL design, and has demonstrated the dependableness of RUSSEL reputation for high quality of workmanship and materials.

**RUSSEL MOTOR AXLE COMPANY**
NORTH DETROIT, MICHIGAN

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**Troy Trailers practically double the hauling capacity for the Saxon Motor Co.**

Note what they say. "I might state that we are hauling from seven to nine tons a trip with this outfit and find it a very cheap way to reduce our cost of freight hauling."

TROY TRAILERS are built in practically all sizes. Write for Catalog 4GV.

**THE TROY WAGON WORKS CO., TROY, Miami Co., OHIO**

SAXON MOTOR CO.
DETROIT

October 15th,

Jaburg Bros.,
New York, N. Y.

Gentlemen:-

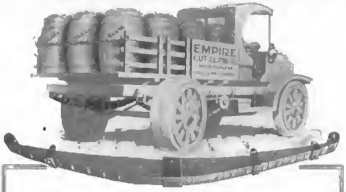
In answer to your letter of the 12th inst., would state that we have been using a five ton Troy Trailer here, for the past year, and have had very good results with it.

This trailer has been used over a route about four miles in length, and is used for hauling Automobile rear axles. It has made about three trips per day. We are at present handling it with a three and a half ton G. M. C. truck, and also used a three about six months with one and a half ton truck. However, the use of this and a half ton truck is for trifling. The three and a half ton truck is, the real service truck, especially handling the trailer very well in all sorts of traffic, and has ample hauling capacity at all times. We are handling from I might state that we are hauling with this outfit and find seven to nine tons a trip, which is a very cheap way to reduce our cost of freight.

Yours truly,
SAXON MOTOR CO.

Republic
Motor Trucks
Internal Gear Drive

**Republic Motor Truck Co.**
**Alma, Michigan, U. S. A.**




**Trust Fragile Freight to**
# DETROIT SPRINGS

THEIR resiliency and flexibility lessen danger of damage. The secret of their smoothness lies in the lubricating cups, near the end of each leaf. These cups are filled with a long-lived lubricant that spreads between the leaves, insuring velvety action and silence. Detroit Springs are

**Guaranteed for Two Years**

against "settling," cracking or breaking—twice that given on ordinary springs. Learn more about Detroit Springs by reading the book "From the Ore to the Motor Car." Write for it.

**DETROIT STEEL PRODUCTS COMPANY**
2260 East Grand Boulevard :: Detroit, Michigan

# SAFETY

—devices protect chauffeurs who operate machines equipped with COTTA Transmissions.

Special COTTA equipment provides a locking device, which positively prevents engagement of two speeds at the same time.

Regardless of speed of car or rotation of gears, speed changes are made easily and instantly with the COTTA Transmission.

Have your next car COTTA safe-guarded.

**Cotta Transmission Company**
814-18 S. Main St., Rockford, Illinois



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CHASE

# Motor Trucks

*Water Cooled* *Worm Drive*
*Heavy Frame* *Unit Transmission*

| ¾ Ton | 1 Ton | 2 Ton | 3-½ Ton |
|---|---|---|---|
| $1500 | $1650 | $2200 | $3300 |

*Write for Literature*

Chase Motor Truck Co.
102 West Street Syracuse, N. Y.

"CHASE YOUR DELIVERY"

BUDA MOTOR
"The part to buy the car by"

# Isn't this the kind of motor for your truck?

"The Buda Co.,
Harvey, Ill.
Gentlemen:
(Part of letter) My Buda Motor has gone 50,000 miles or twice around the world and ALL I've put on it for repairs are four (4) piston rings.
And today I wouldn't give my motor for a new one unless I got a new Buda.
Yours truly,
Clem H. Niederer."

THE BUDA COMPANY
Factory: Harvey (Chicago Suburb), Ill.
Address Factory Representatives: BRANDENBURG & COMPANY
1112 So. Michigan Ave., Chicago 57th St. and Broadway, New York
1311 Dime Bank Building, Detroit

# The 4 Essentials

to the building of a successful motor truck are:

**Simplicity** **High Efficiency**
**Low Maintenance** **Absolute Reliability**

The KREBS Motor Truck is built on a solid foundation of these four essentials

It is simple, yet powerful in design and construction. It has a strong, simple motor and worm drive transmission. It is economical in maintenance. The KREBS Automatic Governor keeps control of the motor and gives just the right amount of gas to meet varying conditions

The Automatic Governor gives highest efficiency by applying the power to meet every changing condition.

The KREBS Truck can be depended on to take care of every working condition imposed upon it with the least possible attention from the driver.

# Krebs

By means of the worm drive, power is applied uniformly and without any loss through bevel gears and pinions.

Made in ¾, 1, 2 and 3-ton models and with bodies to suit all trades.

We have valuable information for those who want to be "shown."

KREBS COMMERCIAL CAR COMPANY
CLYDE OHIO, U. S. A.
*"The Truck That Thinks"*

THE KREBS COMMERCIAL CAR CO. CLYDE, OHIO, U.S.A.



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# SAFE SPRINGS

Manufacturers and individuals everywhere have been giving and will continue to give a great deal of attention to matters of personal safety.

"Safety First." With Chrome Vanadium steel springs on your truck, the trouble from springs is practically eliminated.

On account of the great elastic limit of this material, springs can be designed lighter and have a much greater factor of safety in strength, which insures dependableness at all times.

THE CLEVELAND-CANTON SPRING CO.
CANTON, OHIO

IN every community there are many Motor Truck prospects to whom a sale can be made when factory requirements are not too rigid.

We will help dealers with prospects to make the sale; also, it may be a step toward establishing a permanent and profitable connection. You don't have to buy a "demonstrator."

The
United Motor Truck Company
GRAND RAPIDS MICHIGAN

**New 1916 Edition of**
**Questions and Answers**
By Victor W. Page, M. E.

$1.50

$1.50

**On Modern Automobile Design, Construction, Driving and Repair**

Just off the press. A practical self-educator, consisting of 37 progressive lessons. Contains over 600 pages. Profusely illustrated with photographs and drawings of practical working parts. Includes all the 1916 developments.
Sent prepaid to any address on receipt of price.

**Book Dept., The Commercial Vehicle**
**239 West 39th St., New York**




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# EQUIP YOUR TRUCKS WITH THE PIERCE GOVERNOR

*Used by fully 70% of all truck manufacturers*

PIERCE SPEED CONTROLLER CO.
Anderson, Indiana

# Celfor INTERNAL GEAR DRIVE Axles

**For Motor Trucks—Absolutely Quiet**

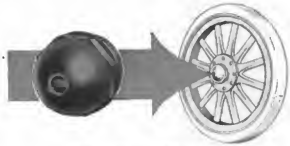
If you want a strong efficient unit drive that is specially designed for truck work, from one to three tons capacity, write us for complete information about the

## Celfor
## Internal Gear Drive Rear Axle

It possesses marked constructional advantages which commend it to thoughtful designers, engineers and truck makers. We shall be glad to go into these in detail on request.

**Write today for details, catalog and prices**

**Celfor Tool Company**
**Buchanan Michigan**



**Dreadnought Transimeter, $20**

# This Hub Odometer Will Save You Money in Truck Operation

Accurate mileage records enable you to operate trucks with greater efficiency. You can check up the day's work, plan shorter routes, eliminate wasted time, save fuel and tires.

# TRANSIMETER
**(Hub Odometer)**

registers every turn of the wheel—both forward and backward; can't be tampered with; absolutely reliable.

## Guaranteed Indestructible

"Dreadnought" type, shown above, has a heavy cast housing which prevents injury to the mechanism from collision—guaranteed.

## Easily Read

No grease or dust can get inside to obscure the glass window—an important feature. The figures remain stationary—always upright and easily read.

***Highest award at Panama-Pacific Exposition***
**Send for Booklet**

AMERICAN TAXIMETER COMPANY
**Mfrs. of the Recordograf and Jones and Popp Taximeters**
1765 Broadway New York City
Service stations in the following cities
*San Francisco, New Orleans, Washington, Chicago, Detroit Philadelphia, Seattle, St. Louis, Boston, Pittsburgh, St. Paul, Los Angeles*

**Recordograf**
Gives a tape record of
1. Time truck is moving
2. Time truck is standing
3. Distance truck covers
4. Speed at various times

**Ford Type Transimeter**
**$15**

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# A New Car—THE BESSEMER

**Announce an Internal Gear 1-Ton Truck at**

**$975.00**

**Continental Motor—Bosch Magneto**
**Ross Steering Gear**
**Torbensen Internal Gear Rear Axle**

***Deliveries November 1st***

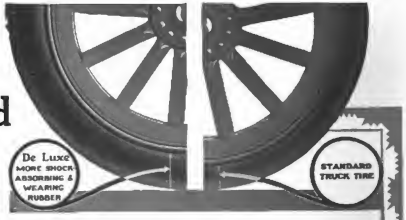
**The complete line of trucks is as follows:**

| Model "G" 1-ton Internal Gear | Model "A" 1½-ton Chain | Model "D" 2-ton Worm | Model "E" 3½-ton Worm |
|---|---|---|---|
| $975.00 | $1800.00 | $2000.00 | $2800.00 |

**Write for our Dealers Proposition**

**Bessemer Motor Truck Co., Grove City, Penna.**

# Vibration—your truck's worst enemy—cornered at last!




Because they're *thicker*—because they put an increased volume of live, resilient, cushioning rubber *between* each rim and the road—Goodrich *De Luxe* tires *act like shock-absorbers on every wheel.*

*Vibration crystalizes steel.* It damages the truck's motor, springs, radiator, steering gear, bearings, transmission, etc.

Vibration starts at the point where tires hit bumps or holes in the road. *Stop it there!* Let the deep, thick, De Luxe tread absorb those jolts and jars right *in the rubber itself*—before shocks can rise to the truck mechanism and injure it. That's reasonable.

The result?—You will save money on repair bills—save money by keeping your truck at work for more hours—save money by *not* having your truck wear out in a few years.

Riding comfort will be improved. As it takes thicker rubber *longer* to wear down, you will get *thousands more miles* out of each De Luxe tire—and save money *again!* Because of the *extra resiliency* in De Luxe tires, your power bills will also be less.

Local Proof?—Many users of Goodrich De Luxe tires are located in *your* city—operating trucks like yours over identical roads.

Write us—*now* for their names. Ask them for their *frank* opinions Then—Make your NEXT tires

**The B. F. Goodrich Company**

**Service Stations and Branches in All Principal Cities**

**World's Largest Rubber Factory, AKRON, OHIO**

**GOODRICH DE LUXE WIRELESS TRUCK TIRES**

***"Make Rough Roads Ride Smooth"***

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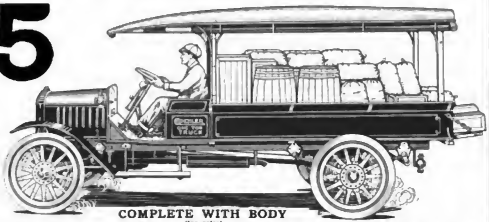
# KOEHLER ONE TON TRUCK

# $895



COMPLETE WITH BODY
(top extra)

**WHEELBASE—129 INCHES.**
**MOTOR**—4 cylinders, **OVERHEAD VALVES.** 35 H.P., large 3-bearing crankshaft.
**TRANSMISSION**—Three speed selective sliding gear. Annular ball bearing.
**BODY**—Extra large, being 8 ft. 6 in. back of driver's seat.
**INTERNAL GEAR REAR AXLE.**
**SPRINGS**—Of graded construction. Front 38 in., Rear 46 in. All bolts have Grease Cups.
**IGNITION**—High tension magneto. **RADIATOR**—built up type with finned top. **BRAKES**, both service and emergency, double acting on rear wheels. **WHEELS**—14 sq. spokes front and rear.
**FLEXIBILITY**—As low as 2 m.p.h. with ton load on high gear. **SPEED**—30 m.p.h. with ton load.

*Agency Correspondence Solicited*

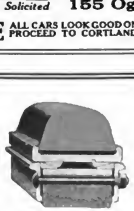
WE do not hesitate to compare the KOEHLER ONE TON TRUCK with any other one ton truck manufactured, irrespective of list price, for economical operation, power under all conditions, efficiency, flexibility, advanced ideas of design, and general appearance.

WE respectfully request that you compare the specifications, appearance and price of the KOEHLER ONE TON TRUCK with those of all other ONE TON trucks.

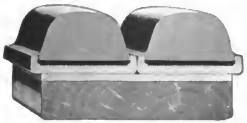
**H. J. KOEHLER S. G. CO.**
**155 Ogden Street - - Newark, N. J., U. S. A.**

**DEALERS, NOTICE** ALL CARS LOOK GOOD ON PAPER—SEE THEM ACTUALLY MANUFACTURED. FROM THE N. Y. PALACE SHOW PROCEED TO CORTLAND ST., TAKE TUBE TRAIN (NEWARK LAST STOP) AND IN 30 MINUTES YOU WILL BE IN OUR FACTORY.

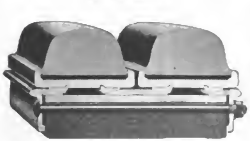
Single Pressed-On



Single Demountable



Dual Pressed-On



Dual Demountable

# Kelly-Springfield

## TIRES For COMMERCIAL VEHICLES

For maximum mileage at minimum cost, equip your trucks with Kelly-Springfield sectional Block Tires on the rear wheels and Kelly-Springfield Pressed-On or Demountable endless Tires on the front wheels. This is the ideal tire equipment for commercial cars. It will deliver record mileage even under unusually severe service conditions.

**Kelly-Springfield Tire Co.**
**Akron, Ohio**
**Branches in All Principal Cities**

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# Diamond T Trucks

| | |
|---|---|
| ¾-ton Worm Drive Chassis..... | $1175 F.O.B. Chicago |
| 1 -ton Worm Drive Chassis..... | 1485 F.O.B. Chicago |
| 1½-ton Worm Drive Chassis..... | 2050 F.O.B. Chicago |
| 2 -ton Worm Drive Chassis..... | 2200 F.O.B. Chicago |
| 3½-ton Worm Drive Chassis..... | 3300 F.O.B. Chicago |

*Specifications*

Continental Motor, 3½ x 5 in.
Timken Front Axle
Timken Rear Axle
Timken - David Brown Worm Gear
Spicer Universal Joints
Gemmer Steering Gears
Wheelbase, 126 inches
Rayfield Carburetor
Bosch Magneto
Long Radiator
Brown-Lipe Transmission
Brown-Lipe Clutch
A. O. Smith Frames
Schwarz Wheels
Mather Pure Chrome-Vanadium Springs

With such concerns as The Standard Oil Company, The American Can Company, The Boston Store and hundreds of other successful business houses, big and little, using DIAMOND T TRUCKS, singly or in fleets, all with unqualified satisfaction, is an endorsement of DIAMOND T engineering ability and business integrity.

All Export Trade and the sale of DIAMOND T TRUCKS in New England, New York, Eastern Pennsylvania, New Jersey, Delaware, Maryland and the District of Columbia are handled by The DIAMOND T MOTOR TRUCK COMPANY, Inc., with headquarters at 245 West 55th Street, New York City.

**Diamond T Motor Car Company**
Chicago, Ill., U. S. A.

# Fill Immediate ACME Orders!

**DEALERS:** Get the December and January business of local truck buyers who want ACME Two-Ton Trucks for early 1916 delivery.

Get the ACME Agency now—and sell easily, with substantial profit. No large service to render because of famous "Proved Units" from radiator to tail light. Oversize dimensions. Powerful 40 H.P. Continental Motor. Big Capacity. $2,000.

ACME THE TRUCK OF PROVED UNITS

Be in a position to accept business on our NEW ¾-Ton Truck to be announced soon.

Write for Booklet, "A Business Builder," and Territorial offer today. Or WIRE—

**Cadillac Auto Truck Co.**
40 Mitchell Street
CADILLAC, MICHIGAN

# Audel's Gas Engine Manual

This volume gives the most valuable information respecting the construction, care and management of **Gas, Gasoline and Oil Engines, Marine Motors and Automobile Engines,** including chapters on **Producer Gas Plants** and the **Alcohol Motor.**

The work is divided into 27 chapters Each chapter is illustrated by diagrams which make it a thoroughly helpful volume, containing 512 pages, 156 drawings, printed in large, clear type on fine paper, handsomely bound in rich red cloth, with gold top and title, measuring 5½ x 8½ inches, and weighing over two pounds.

The book is a practical educator from cover to cover and is worth many times the price to any one using a gas engine of any type or size.

**Price - - - - $2.00 Postpaid**

***Book Dept.*, The Commercial Vehicle**
239 West 39th Street, New York




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# McGraw

## TRUCK TIRES

### GUARANTEED 8,000 MILES

Resiliency to smoothly cushion and protect all loads, —Correct Tread Shape to prevent lateral motion and give maximum tractive surface,—More Tread Rubber to insure the longest mileage —All these *indispensable essentails* and *good building* go to make up the lasting wearing qualities and economy of McGraw Truck Tires.

McGraw Truck Tires are made in all sizes, all types and for all conditions of service.

*Write today for catalog and prices*

**The McGraw Tire & Rubber Co.**

**East Palestine, Ohio**

New York, 1886 Broadway
Boston, 667 Boylston St.
Buffalo, 737 Main St.
Atlanta, 227 Peachtree St.
Dallas, 2004 Commerce St.
Chicago, 1442 Michigan Ave.
Kansas City, 1516 Grand Ave.
Pittsburgh, 1006 Chestnut St.
Newark, N. J., 305 Market St.
Philadelphia, 3645 Lancaster Ave.




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Overland
TRADE MARK REG.
Delivery Cars
Prices f.o.b. Toledo

# Give the Shipping Room a Chance

Your office has its time-saving devices. Your sales force its up-to-date system and methods.

How about your shipping department?

One day with your driver will convince you that you can save money by using motor delivery.

Your competitor is advertising his up-to-date business methods every time one of his cars makes a delivery.

He is getting a powerful grip on the trade by his prompt attention to delivery.

He is both saving and making money.

Motorize your business with the Overland delivery car.

The price of the car is astonishingly low—the cost of operation exceedingly small.

The famous 35 horsepower Overland motor has power in abundance. It is smooth-running and always reliable.

The Overland delivery car is electrically lighted and started. Ignition is by high tension magneto. The car has a revolving oil indicator, large tires and other advantages found on no other delivery car at this low price.

"Made in U. S. A."

**$725** Open Express Delivery Car

Write today for special delivery car catalog. Please address Dept. 191.

**$750** Panel Body Delivery Car

**The Willys-Overland Company**
Toledo Ohio

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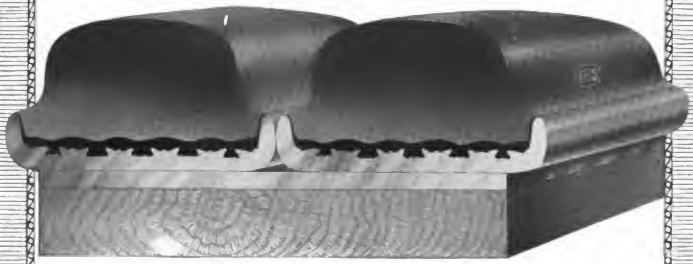
*The New*

# UNITED STATES TRUCK TIRE

**The United States Pressed-On Truck Tire has a substantial steel base with side flanges that prevent the rubber tread from scraping against curb stones and other obstacles. This tire is vulcanized under 800 tons pressure—by the only press of its kind in the United States.**



The steel base of the United States truck tire contains many mileage increasing improvements. One of the most important of these is,—

## An Improved Channel Base

The steel base of the United States Pressed-On Truck Tire represents an important advance in heavy service tire construction. Its improved side flanges protect the union of the hard rubber and the tread rubber. The flanges also receive all the shock, when the tire comes in contact with curb stones and other side scraping obstacles.

The dove tailed serrations in the new steel base are extra deep. This makes it possible to anchor the hard rubber to the steel base so firmly that separation is impossible, even under the most severe strain. In addition to the improved steel base, the new tire contains other vital improvements. Some of them have been described in previous advertisements and others will be explained in the near future

## United States Tire Company

**Broadway at 58th Street New York City**

**Branches in all principal cities give prompt, liberal and courteous service**

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# TO MEET COMPETITION

you should have complete details in a compact form of not only the truck you are selling but of all machines handled by other dealers who are bidding for the same order you are after—

***Over Three Hundred and Seventy-seven Gasoline Commercial Vehicles***

## 1916 SPECIFICATIONS IN TABULATED FORM

WILL BE PUBLISHED IN THE

*JANUARY FIRST NUMBER OF*

## THE COMMERCIAL VEHICLE

***Further*** **This important number will contain:**

- A Complete Directory of All American Builders of Electric, Gasoline and Steam Commercial Vehicles.
- A Complete List of Machines using Worm Drive, Internal Gear Drive, etc.
- A Complete List of Machines Propelling Through Springs.
- A Complete List of Four Wheel Driven Trucks.
- A Complete List of Trucks Using Front Drive.
- A Complete List of Trucks Using Automatic and first Spark Advance.
- A Complete Buyers' Guide, Giving Name of Machine, Capacity in Pounds, Chassis Price, Wheelbase, Tires, Motor Horsepower, Gearset Type, Final Drive, etc.
- A Complete Table of Specifications and Buyers' Guide of All Electric and Electric Industrial Trucks.
- A Resume of 1916 Trucks, Illustrated.
- A Resume of the Average 1916 Motor Truck.
- A Resume of the Tendencies of 1916 Trucks.
- A Resume of the Trends in List Prices.
- A Resume of the Trends in Load Capacity.
- A Resume of the Trends in Truck Design.
- A Detailed Report of Status of Different Features of Design Expressed in Percentages.

Regular Departments as Usual.

WHY

should you spend $1 (the special truck dealers rate) of your money for a year's subscription to

***THE COMMERCIAL VEHICLE?***

WHY

should you, a motor truck dealer, spend your leisure hours reading

***THE COMMERCIAL VEHICLE?***

BECAUSE

it gives its readers all the news of the motor truck industry while it is still news.

BECAUSE

it confirms all news items before publication, thus insuring its readers with information which is both accurate and reliable.

BECAUSE

its editorial staff is made up of trained men who are able to study the delivery problem of the motor truck owner and to present the results of such study in a manner which will permit other motor truck owners to profit thereby.

BECAUSE

it maintains a Readers' Forum department especially for the benefit of motor truck owners, in which all questions pertaining to motor truck operation, design and construction are answered gratis, without bias, and from the owner's viewpoint.

BECAUSE

it describes the new trucks as soon as they are on the market as well as the latest accessories designed especially for motor truck use.

The sale of **one truck** will pay a hundred times over the cost of a subscription, **but why stop here Your salesmanship,** along with what The Commercial Vehicle will tell you twice each month the facts it presents, the actual experiences detailed, **will sell for you** many trucks during 1916

BE SURE TO READ

**The COMMERCIAL VEHICLE**

**READ BY BUSINESS MEN**

239 West Thirty-ninth Street
New York City




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# "Cost of upkeep low beyond our fondest expectations"

THE SIMPSON SPRING COMPANY, *Manufacturers of Carbonated Beverages, South Boston, Mass.*, write us that the cost of upkeep of their three

## SELDEN TRUCKS

during the past year was low beyond their fondest expectations. They also report that they "obtained a very satisfactory amount of speed and mileage from the quantity of gasoline consumed."

The cost of upkeep of Selden Trucks is exceedingly low. They are built to withstand the hardest kind of service. And they make good every time.

**Dealers** Consider the partial payment basis upon which you can sell Selden Trucks — Worm Drive $750 down, Chain Drive $500 down—and $125 a month. Consider that you can place a high grade truck within the reach of the smaller merchant. That is another reason why Selden Trucks are easy to sell. Write us about handling your territory. Our dealer proposition is an attractive one.

## Selden Truck Sales Co.

Rochester, N. Y.




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EVIDENCING our promise to do everything humanly possible to take care of the present greatly increased demand for Brown-Lipe Differentials and Transmissions and to provide means for accepting at least a part of the considerable business that has been offered to us, but which we could not accept, work has been started on an enlargement of the Brown-Lipe-Chapin plant.

This enlargement which will involve the expenditure of $750,000 will give us practically 50% increased capacity. The new addition will be six stories high, 190 x 70 feet of reinforced concrete, corresponding in the exterior appearance with the main building erected six years ago.

Brown-Lipe Gear Co.
TRANSMISSIONS

Brown-Lipe-Chapin Co.
DIFFERENTIALS

SYRACUSE, N. Y.

NEW YORK
Thos. J. Wettel, 29 W. 42d St.
CHICAGO
K. Franklin Peterson, 122 So. Michigan Ave.

DETROIT
L. D. Bolton, 2215 Dime Savings Bank Bldg.
SAN FRANCISCO
A. H. Coates, 444 Market St.

Foreign Agent, Benjamin Whittaker, 2, Norfolk Street, Strand, London, W. C.




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# BROWN-LIPE PRODUCTS

The case hardening plant will also be doubled in capacity, work also commencing on that immediately.
With the completion of the new additions more than 2000 persons will be carried on the payroll. Our plans call for occupancy of the new addition early in the spring.

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# A Continental Majority

CONTRACTS for Continental Motors in 1916 are already signed by 145 manufacturers of motor cars and trucks. This is a vote of confidence on the part of manufacturers which accurately reflects the sentiment among dealers and the public

## Continental Motors

Among automobile and truck dealers a recent canvass has again demonstrated the remarkable popularity of the Continental Motor. A large majority declared their preference for the Continental Motor, even in cases where they have the agency for a car or truck not Continental-equipped.

Dealers know from actual experience how widespread is the fame of the Continental Motor among the buying public. They realize that when selling a car or truck, no question is raised about the motor if it is a Continental.

Public confidence and dealer confidence are mutually dependent. Equally upon the two rests Continental reputation. To the buyer of a Continental-equipped car or truck, it ensures satisfaction and peace of mind. To the fifteen thousand dealers and sub-agents, who constitute the great Continental Majority, it ensures sales transacted with ease and pervaded by good-will.

Back your line with a Continental Motor: be one of the majority.

**Continental Motor Mfg. Co.**

Factories: DETROIT—MUSKEGON

Largest Exclusive Motor Manufacturers in the World




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# DUPLEX 4 WHEEL DRIVE

## Where Strength Is Needed

The DUPLEX 4-Wheel Drive Truck is the most powerful yet flexible form of commercial vehicle ever produced.

There is no task too great for its inexhaustible powers.

The power is evenly transmitted from the axle drive to the driving pinions through the universal joints to each of the four wheels, giving perfect distribution of power at all times.

The greatest tribute to the high quality and efficiency of the DUPLEX 4-Wheel Drive Truck lies in the fact that the United States Government uses them in the Army Signal Corps Division and in the Marine Corps Division.

The Government has recently placed their third order for DUPLEX Trucks for military purposes.

The DUPLEX 4-Wheel Drive Truck is manufactured in 2 and 3-ton capacity.

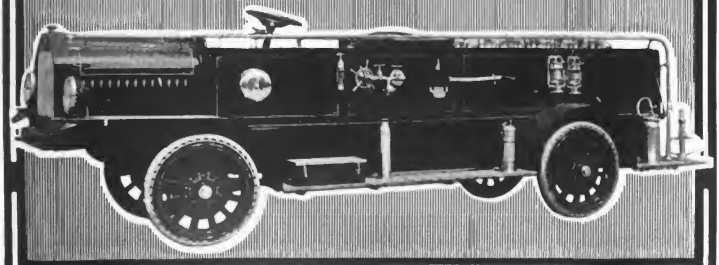
Simple in construction. Economical in operation.

**DEALERS: This is a wonderfully attractive proposition. Write immediately.**

**THE DUPLEX-POWER CAR COMPANY**

**MANUFACTURERS OF FOUR WHEEL DRIVE TRUCKS**

**CHARLOTTE - MICHIGAN**



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# 1916 Will Be "Another FEDERAL" Year

Part of the Additions Being Made to the Federal Factory

"Business is Booming" has always been a reality for Federal Dealers.

But 1915 has been THE FEDERAL YEAR!

The worm drive model FEDERALS, 1½, x and 3½ tons capacity, have met with remarkable success everywhere.

Federal dealers have made such big gains in sales that our output was more than doubled.

AND FEDERAL DEALERS WERE GIVEN THE PREFERENCE ON DELIVERIES RATHER THAN FOREIGN WARRING NATIONS. AMERICA FIRST IS OUR POLICY!

The most constructive co-operation was given to our dealers by the Federal organization, on Sales, Advertising, Service, and other problems in which our experience enables us to aid our dealers

## 1916 WILL BE A STILL BIGGER YEAR for FEDERAL Dealers

New factories under construction will double the output of 1915.

Where success based on quality, experience, and honorable dealings abounds, your assurance of success is greatest. All Federal dealers are making money—so is the Company—and the trucks themselves are the greatest successes in the field.

Join this success to your own ability and experience as a dealer.

The first step is to—

*Write us for Federalized territory*

## Federal Motor Truck Company

**122-130 Leavitt Street** **Detroit, Michigan**




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Interior View Of The New Garford Factory Addition

Additions to the Garford line—

Additions to the Garford organization—

These two factors have given remarkable impetus to Garford business.

Our factory is working overtime in order to keep our distributors supplied with trucks to meet the growing demand.

Our production has been greatly increased. Shipments are larger than ever before.

Garford Motor Trucks

A large factory addition now nearing completion enables Garford distributors to foresee even bigger business.

There is still some good territory open for live distributors.

Communicate with us today.

*Please address Dept. 103*

**Garford Motor Truck Company, Lima, Ohio**




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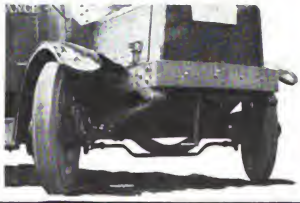
# Greatest Efficiency, Only

The United Line

The United Line



The United Line

## Semi-floating Construction
## Ball Bearings for Worm Loads

SHE

¶ Look particularly at the two lower illustrations on the opposite page. Note the simple, clean-cut appearance of the chassis. Note the absence of torsion tubes, radius rods, truss rods or weight making complications of any sort.

¶ And yet, even the layman can see that here is a strong, durable construction that must register great efficiency. Such advanced construction as is exemplified in these United Trucks is possible only with Sheldon Worm Gear Driven Axles.

¶ The Sheldon application of the semi-floating type of construction with its simplicity and light weight is probably the most prominent feature of design. This fundamental feature, combined with the use of ball bearings for

**The Sheldon Axle**

*Makers of Springs and A*

**Wilkes-Barre**

Chicago: 122 S. Michigan Blvd. Detroit: 12

"Exhibiting Section 16, Transportation Bld



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# Consideration in Design

Drive Through Rear Springs
Brakes on Rear Wheels

DON

carrying both the radial and thrust loads of the worm gear, is largely responsible for the high percentage—95 to 97%—of power delivered at road wheel contact.

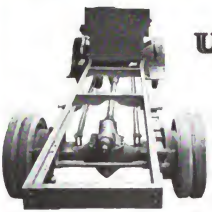
¶ By designing this worm gear axle so that the driving strain is taken through the springs, while the braking strain is taken through the wheels, instead of on the propeller shaft, it is possible to produce a strong, durable, highly efficient chassis in which all unnecessary complications are eliminated.

¶ These particular illustrations of United Trucks show the construction of one of their big Sheldon equipped motor buses, such as are operated regularly between Minneapolis and St. Paul.

**l Spring Company**
*More Than 50 Years*
Pennsylvania
lward Ave. San Francisco: 444 Market St.
nama-Pacific Exposition, San Francisco"

*The* **United** *Line*

*The* **United** *Line*



*The* **United** *Line*



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# "The Spring Is the Thing"

## MATHER

Scientifically Heat-Treated

## SPRINGS

designed to insure

## Maximum of Elasticity and Endurance

with

## Minimum of Vibration

Genuine made only by

## The Mather Spring Company

Toledo, Ohio




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# HESS-BRIGHT
## THE INIMITABLE BEARING

*Compliments of the Season*

**The Hess-Bright Mfg. Co.**
**Philadelphia, Pa.**

HESS-BRIGHT'S CONRAD PATENTS ARE THOROUGHLY ADJUDICATED




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# TORBENSEN

INTERNAL GEAR **DRIVE** FORGED I BEAM

## TYPE "A" TORBENSEN DRIVE FOR ONE-TON TRUCKS

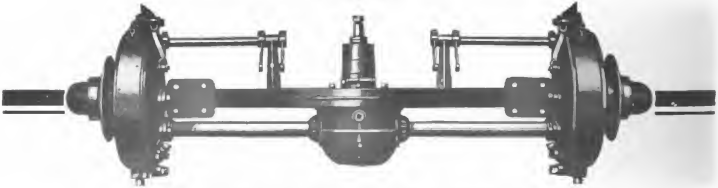
The new model is the embodiment of all the improvements and refinements that have been developed in the past years of experience of the TORBENSEN engineers.
Among the new features in this model are—

**Differential housing in center of axle, giving greater accessibility.**
**Bevel gear double size.**
**Brakes larger and more powerful.**
**Jackshafts splined at both differential and pinion ends.**

This model is the greatest advance in transmission ever developed for a one-ton truck.
Write for further particulars.
Our two-ton model of the same type will be ready February first.

## Torbensen Gear & Axle Company

**Cleveland, O.**



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Changes in copy for advertisements in the next issue to be in the office of publication not later than 10 days before date of publication.

Read

If you read at all, don't fail to read the next issue of

The COMMERCIAL VEHICLE

Annual Forcast Issue
January 15, 1916

It will contain a directory of all important makers of motor trucks in America.

Specifications of all important trucks.

Electric and electric industrial and steam vehicles will be covered as well as those using gasoline power. There will be an article on tendencies and trends for the new year.

Unless you want to be out of step with developments for a whole year, better make sure that you get this number and be sure that it is

Read



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# Autocars Are Extensively Used in the Lumber Business

*C. B. Coles & Sons Co., Camden, N. J., decided on the Autocar to meet the demand "for quick work in hauling to the suburbs, which costs heavily by team on account of the time consumed in making the long trips."*

*Representative lumber and building materials companies in all sections of the country are adopting Autocar Motor Vehicles, not only because of the saving in time, but also because Autocars make long haul business economical and give prompt, regular service at all times.*

*Write for illustrated catalog and list of over 3000 concerns using Autocars in every line of business*

**Chassis Price, $1650**

***THE AUTOCAR COMPANY, ARDMORE, PA.***

***Established 1897*** ***MOTOR DELIVERY CAR SPECIALISTS***




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The COMMERCIAL VEHICLE
Read by Business Men

Vol. XIII | January 1, 1916 | No. 11

# Banner Year of Truck Industry Presages 1916 Progress

## Greater Efficiency in Truck Manufacture, Better Trade Practices and Greater Value To Buyers Results of Export Development

EMERGING from a year of unprecedented progress, both from the standpoint of business done and technical development, the commercial vehicle industry enters the new year offering the public a paradox. There are more radical changes in the models offered the 1916 buyer from those which he was offered a year ago than in any time previous, and yet he will find it harder than ever to pick and choose between the products of different makers.

Trucks for 1916 are different from those of 1915 and yet they are much like one another in most respects. The experimental design is no longer in evidence. The freak construction of other days has disappeared. There are trucks which to all outward, or, indeed, inward appearance are identical which nevertheless are produced by entirely different concerns and sold in direct competition. Trucks are likewise less expensive, they are more highly refined, lower, trimmer, easier riding and more convenient and simple of operation. The reason for this is to be found in the tables to the right and left of pages 6 and 7 of this article.

The wonderful growth of the export market has brought about a great increase in the percentage of manufacturers who do an export business. This has greatly increased production, which in turn has enabled old designs to be abandoned and progress to be inaugurated along new lines looking toward greater simplicity and more extensive standardization, both in the ranks of the assembler of specialist-made components and among the manufacturers of complete vehicles from raw materials.

The assembled truck of today is not the ill-assorted

**THE YEAR'S PROGRESS IN A NUTSHELL**

Number of manufacturers increased from 213 to 248, or 35.
Forty-six new manufacturers—only eleven makers out.
24,000 trucks worth $65,000,000 exported.
74,000 trucks built.
50,000 sold to domestic purchasers.
120,000 trucks in use in the U. S. A.
Production of 75,000 trucks planned for 1916 domestic sale

### New Motor Trucks on the 1916 Market

Acme
Acason
***Allis-Chalmers
†Andover
**Beech Creek
Bell
Bollstrom
Brinton
Briscoe
††Buda
Continental
Crowther
*Dominion Tractor
Elmira
Falcon
Gary
Gersix
Globe
Hall
**Hoadley
Haughton
Howard
Hannibal
Detroit
Larrabee
Lenox
Lima
Lincoln
***Lombard
Metz
Mohawk
***Phoenix Centiped
*†Piercy
R.-S.
*Tractor
**Four-wheel drive
***Creeper drive
Iowa
Sphinx
*Standard Tractor
Stearns
Superior
§Titan
Tower
*Transport Tractor
United
Watson
**Weier-Smith
Wisconsin
+Electric
††Electric industrial
*‡Gasoline-electric
§Steam

### Old Friends With New Names for 1916

| New Name | Old name |
|---|---|
| *†Burford | Lauth-Juergens |
| †Burford | Fremont-Mais |
| *Columbia | Kalamazoo |
| Gramm-Bernstein | B. A. Gramm |
| G. V.-Mercedes | American Daimler |
| Kelly-Springfield | Kelly |
| Robinson | Golden West |
| Salvador | Mansur |
| *Sterling | Sternberg |
| †Warren | Standard of Ohio |

*Product changed
†Concern reorganized

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array of ill-fitting and poorly-harmonized units of the past. It is a combination of parts which, while made by specialists in the production of only a few of the components of the motor truck, are none the less students of commercial vehicle engineering in a broader way. These parts have reached a high degree of standardization and the standard of quality maintained by the important parts makers compares very favorably with that so characteristic of the exclusive manufacturer.

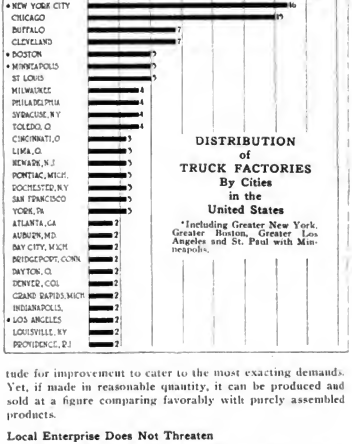
The modern designer of a motor truck gearbox is well versed in the progress and trends in engine design. If he does not make clutches, he knows what the different types are, what their capacity is and which are properly and harmoniously adapted to his product. Likewise, he is conversant with developments in driveshaft and driving axle design. So with the motor engineer and the builder of axles, radiators, steering gears and the host of other standardized components which are today offered the assembler.

### Manufacturers Show the Way

Progress in the truck field is largely governed by the advances made by those producers who contrive their own designs and make all important elements under their own roofs. The inspiring development in design which has been made in the past twelve-month owes much to this class of concern. For the same basic causes above enumerated in reference to assembled vehicles, the buyer is able today to procure a correspondingly developed job in the manufactured class.

Quantity production has fostered economies in design and manufacturing processes which have more than offset the rise in the costs of materials. The improvement in the products of parts specialists and the development along specialized lines in axle construction and in motors have resulted in a modification of the under-one-roof policy of some of the important manufacturers, and the maker who produces part of his vehicle entirely in his own shop, but who buys from one-fourth to two-thirds of his standardized parts from specialists has come into increased prominence.

Such a vehicle possesses individuality. It differs sufficiently from others on the market. It allows of sufficient latitude for improvement to cater to the most exacting demands. Yet, if made in reasonable quantity, it can be produced and sold at a figure comparing favorably with purely assembled products.




### Local Enterprise Does Not Threaten

There was a time when it seemed that the local assembler, oftentimes a builder of motor truck bodies, a wagon builder or small manufacturer would become a serious factor in the motor truck world. These concerns were able to purchase the same parts used by the concerns doing a national business and to put them together in something of the same manner. They were makers and dealers combined, had little equipment to speak of and could do business with very little capital and at small cost. Being identified with the local business life they were in an especially good position to do an extensive credit business and factory service was assured.

That he has not become more of a factor in the truck industry is due partially to the shortage of parts brought on by the war demand and the increased local demand, leaving less of a surplus of parts on the parts makers' hands to be disposed of to the smaller concerns. A corresponding shortage of parts and of vehicles in the passenger car industry has caused dealers everywhere to make more of an effort with motor trucks. This has resulted in the opening up of much additional truck distributing territory. There has been a real shortage of trucks in 1915 while in 1913 and parts of 1914 there was an oversupply for a time. This shortage has resulted in a number of erstwhile local or sectional concerns entering the national field.

### Future Promises Much

A number of new concerns have placed vehicles on the market, and failures or financial difficulties have been few. There have been a number of reorganizations which have made for sounder finance and better business conditions. In spite of the well-known prosperity of the industry in the past year and the growing realization of the bright future which awaits the business, there has been a gratifying lack of unsound stock-selling enterprises in the motor truck field.

Credit selling is more general than it has been, but at the same time it is being carried on along more conservative lines. About half of the truck makers in this country do a

## Few Local Manufacturers

Below appears a tabulation of manufacturers classified according to markets catered to:

| Class of market | Percentage |
|---|---|
| International | 37 1/3 |
| Sectional, a group of states | 37 1/3 |
| National, the whole country | 16 |
| State | 6 2/3 |
| Local, confined to a city or county | 2 2/3 |
| | 100 |

## Most Makers Build Bodies

Below, in percentages, is given the different policies in regard to factory-built bodies:

| Body Policy | Percentage |
|---|---|
| Standard bodies supplied | 76 |
| Stripped chassis only | 13 1/4 |
| Seldom supply bodies | 8 3/8 |
| All chassis sold with bodies | 2 3/8 |
| | 100 |

## Many Concerns Extend Credit

Credit policies of different manufacturers are given as to per cent in the table below:

| Credit policy | Percentage |
|---|---|
| Have a credit scheme | 45 |
| Refuse to grant credit | 40 1/2 |
| Leave it to banks and credit brokers | 5 3/8 |
| Rarely grant credit | 4 |
| Leave matter to dealers | 2 3/4 |
| Extend credit locally only | 1 3/8 |
| | 100 |

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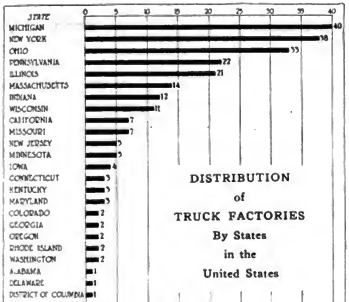


more or less extensive credit business and as a general rule, such sales are successful because selling methods have improved. Realizing the folly of selling trucks where they are not adapted, it is but logical that in becoming a partner in the use of a truck, as the maker does when he aids in financing the purchase, sales that will not result in profit to the buyer are carefully avoided by the great majority of concerns.

There is still a large coterie of makers who steadfastly refuse to have anything to do with credit sales. Dealers in some cases assume this responsibility, and a number of concerns have arrangements with credit brokers under which satisfactory terms are made.

The attitude of the banker toward the financing of motor truck investments by business houses of responsibility has not changed radically, as banking policies are necessarily conservative. The war, too, has had its effect in discouraging new ventures along this line, but there is every reason to believe that the attitude of bankers will be more favorable to credit purchases of motor trucks in the future, for the war, while a temporary deterrent, is acting as a powerful aid in the rapidly spreading education to all sorts of business men as to the advantages and fundamental economy of motor haulage.

### Trailers Growing in Favor

Trailers have grown tremendously in favor. The majority of makers today favor in more or less degree the proper application of trailers to motor trucks, while the tractor is much more in evidence than formerly. The policy of makers has been conservative in this direction, but improvements in the construction of trailers themselves and in motor chassis have served to overcome many of the objections to them formerly advanced. Experience with them has also shown their advantages in respect to decreased loading time, increased capacity, and adaptability to loads of unusual bulk, cumbersomeness, etc.

Electric starting and lighting for motor trucks has not made the progress that might have been expected. The reason for this is that the electric starter was originally devised as an added luxury for the passenger vehicle and has been developed along lines of passenger car requirements. The demand for starters has been so great in the passenger car field that it has largely absorbed the production without the necessity of manufacturers of electric systems seeking for a further market in the commercial field.

Truck makers, on the other hand, have not forced matters to a conclusion because of the absence of any extensive or insistent demand except in the smaller capacities of delivery vehicles.

In this field, the entering wedge has had good effect. As many of the builders of large numbers of light delivery vehicles are also constructors of passenger types, it has been easy for them to apply starters to their commercial models, and, as these chassis are almost invariably well sprung and mounted on pneumatic tires, excellent success has resulted and informed buyers of this class of vehicle are demanding electric starting and lighting.

With the solid-tired vehicle, it is not the same, however. A more robust and simpler form of electric system is desirable for use in the medium and heavier capacities. It should not be difficult to develop such apparatus, but it is not to be expected that electric manufacturers will take the whole initiative in this matter.

### Starter Difficulties Not Great

There is also much opposition to the electric starter on the ground that it is an additional complication to the chassis, which even now is not simpler than is to be desired for use in the hands of the usual class of non-technical driver and owner. This objection is no doubt valid when applied to the attached type of starter which has hitherto been practically the only type in evidence on solid-tired trucks. However, in the new designs of trucks produced by exclusive manufacturers as well as standard types of engines, the growing popularity of the unit power plant construction has permitted provision to be made for a more integral application of the generator and motor to the engine. This removes the difficulty of accessibility to parts of the engine or the electric system, it provides a firmer attachment for the units, and in general removes many of the objections to the indubitable complication of the power plant.

At the relatively higher speeds at which gasoline trucks are operated it seems that a better-suspended battery box may be required for the motor truck starting battery than is found in the battery-operated electric truck of equal capacity.

## Most Trucks Are Assembled

Below are tabulated percentages of makers of motor trucks according to three methods:

| Method of manufacture | Percentage |
|---|---|
| Assembled from standard parts | 65 2/3 |
| Partially assembled | 23 1/3 |
| Manufactured by maker | 11 |
| | 100 |

## Trailers Are Generally Approved

The following symposium represents current opinion as to trailers among truck companies:

| Trailer policy | Percentage |
|---|---|
| Approved | 35 1/2 |
| Not indorsed | 18 3/4 |
| Provision made for attachment | 15 1/4 |
| Indorsed under restrictions | 13 1/3 |
| Noncommittal | 10 2/3 |
| Optional with purchaser | 5 1/4 |
| Indorsed for country work only | 1 1/4 |
| | 100 |

## Starter Question Unsettled

In the table below sentiment among builders is tabulated as to electric systems:

| Electric Starter Policy | Percentage |
|---|---|
| Supplied on buyer's option | 31 3/4 |
| Not indorsed | 22 2/3 |
| Approved | 21 |
| Refuse to provide | 7 1/3 |
| Installed as stock equipment | 6 1/3 |
| Electric lighting only supplied | 4 1/2 |
| Noncommittal | 3 2/3 |
| Will be stock equipment later | 1 3/4 |
| Used on light capacities only | 1 |
| | 100 |

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# What the War Has Done for the Truck Trade

## Motor Buses and Conventions Features of 1915

PROGRESS and its rate is better appreciated in the backward glance than that ahead. It is a fact that the sensation of speed in a moving vehicle is enhanced, or we might say more truly appreciated, by looking at the receding road than if one looks forward to the way to be traversed.

In looking forward one's imagination penetrates farther into the mystery of the road ahead than the eye actually perceives, but in the backward glance the imagination is not stimulated, for one views only scenes which have already been witnessed, the rapidity with which these pass beyond the range of vision is truly appreciated because of a more accurate knowledge of their true extent

So in gaining an accurate perception of the progress made by the motor truck industry, one does well to look backward a year. The great war stands out most prominently in the history of the commercial vehicle world, as in almost every other field.

### Exports—What They Mean

In the year past no less than 24,000 trucks, worth $65,000,000, have been exported to foreign nations, mostly European belligerents. Among these France and Russia rank first, then England and Belgium that was. These exports are progressing at about the same rate today as they have been since the beginning of the war nearly a year and a half ago.

Exports have also consisted to some degree of vehicles intended solely for commercial work, principally in England and Scotland. There has been some effort at developing the British colonial markets, notably Australia, and Canadian consumption of U. S.-built trucks has increased. On the whole, however, exports have chiefly comprised war orders.

American manufacturers have unquestionably failed to grasp an opportunity that was golden in neglecting the Australian, South African and South American markets, formerly the property of Great Britain and Germany and now largely without supply. It is not now too late. War buying has become a mechanical process as nearly automatic as the expenditure of nearly $5,500,000 a month can be. There seems to remain no good reason why enterprising concerns should not send representatives to Australasia, South America and Africa, for surely if in the face of the bitterest prejudice and opposition, American trucks can find an extensive market in England itself, her colonies and our own neighbors will give them at least a fair show.

### Preparedness and Motor Trucks

Linked closely with the European war is the great movement in this country for military preparedness. The example of the Allies, both Teutonic and Entente, in the extensive use of motor trucks for all manner of service; the motor-wrought repulse of the early German drive on Paris, and the eloquent proclamation of the indispensableness of motor transport vehicles voiced by the belligerent powers in their continuous and extensive purchases of American vehicles, together with the widespread publicity for the motor truck which has been a feature of newspaper reports, have convinced all who read and think that the present mule transport service of the United States Army may quite possibly prove to be its Achilles' heel.

Accordingly a prominent feature of the military training camps which have been held in various parts of the country in response to public clamor has been the extensive use of motor transport. We have seen the motor truck employed extensively at Fishkill Plains and Plattsburg, N. Y., at Fort Sheridan, Ill., and at Los Angeles, Cal. A prominent military academy sent an armored train across the continent. A group of public-spirited business men have presented the National Guard of New York with a completely-equipped motor train and a sum has been appropriated by the legislature to maintain it.

The army itself has made purchases of motor trucks to the number of 100 or more and is constantly adding more to its equipment. Congress has appropriated $50,000 for armored motor vehicles. In the border skirmishes in Texas, motor trucks have been put to use in practical military operations for the first time in this country with the exception of a limited amount of service in the Philippines and in Vera Cruz. General Funston has made urgent appeals for more motor trucks.

Another epochal development of the last 12 months has been the rise into prominence of the motor bus. Starting with the guerilla rise of the jitney bus in several western cities and quickly spreading over the whole land, the public was seized with a strong distaste for the street car, and the possibilities of passenger transportation at wholesale rates as a business appealed to thousands of owners of small cars, second-hand touring cars and all kinds of motor trucks.

### The Rise of the Motor Bus

This mushroom growth soon fell into inevitable decay, but not without a grave effect upon electric railway incomes, and not one, but several, street railway companies were forced into severe financial straits by the jitney competition. The jitney bus mushroom also proved an excellent fertilizer for the development of the substantial and permanent growth of the motor bus. Premature ventures were started and in some cases failed. A number of others, however, met with good success.

In New York City the circumstance that the sole motor bus franchise was held by a company largely controlled by the traction companies prevented the threatened jitney invasion. This because they were clearly subject to the pubic service regulations, and as such, would be required to secure franchises and submit to Public Service regulation. Several attempts were made, however, to install independent bus lines. One attempt failed because the type of vehicle chosen was proven impracticable.

A second attempt resulted in the recommendation by the Franchise Committee of the Board of Estimate that one of the petitioners for a franchise be granted one. Effective action by the existing bus company, which put in counter proposals for extensions to its own lines, and by the traction companies, have so far resulted in so delaying the matter that the public has lost interest and the parties have lost much patience.

In a legislative as well as financial way, the jitney bus has left its mark. The country over there has been such a host of hastily-prepared and ill-advised law-making at the behest of traction interests in order to stifle this new competition as has rarely been met with anywhere.

The lesson of the jitney bus era has been that street railway companies have been forced to prove that service without congestion, crowded cars and strap-hangers is incompatible with dividends; that the public, when given a choice, prefers almost anything to the street car; that it will even

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pay a higher fare to ride in more pleasant surroundings and in greater comfort, and that the motor bus, built, as it should be, on a commercial vehicle chassis and seating from a dozen to forty passengers, has a place in modern transportation that cannot be filled by any other means of conveyance, and that it is adaptable to a field of service now occupied by street railways to poor advantage. The street railways themselves have realized this and are accordingly adopting motor buses widely for extension-line and feeder service.

Along more purely ethical lines, there has also been progress. On May 5 and 6, the National Automobile Chamber of Commerce opened its second motor truck manufacturers' convention—and its first open one—in the Hotel Statler, Detroit. To this fifty-six manufacturers' representatives attended. Service was the principal topic discussed. As a result of this convention, service policies have been greatly rationalized by different concerns, a better understanding of the service question has resulted and a movement to draft and approve a standard policy, along similar lines to the N. A. C. C. standard guarantee, has been set on foot.

#### The Convention and Service Problems

As a direct outgrowth of the thought aroused at this meeting, several service managers' conventions have been held at various points, and there seems to be hope that two separate standard service policies will be adopted, one for truck makers and another for passenger car concerns.

With service policies standardized and all important makers working in harmony on this subject, as they have in the past and do today on the subject of guarantees, one of the greatest bugaboos of the trade will have been overcome and the owner's attention will be more and more directed to the real issue in truck buying—the quality and adaptability of the vehicle, rather than the empty and sometimes desperate promises of free service and ridiculous guarantees made by competing salesmen. He will be brought to realize his own responsibility in the way of care and attention.

# The Electric Truck

## Storage Battery Rental and Service Solves Greatest Problem

BATTERY service is the most prominent development in the electric vehicle field during 1915, and all indications point to extension of battery service during the coming year. Since the electric vehicle is dependent entirely upon its battery for power, and since this battery is also dependent usually upon some central source of current supply, it is but logical for the same company which supplies the current to perform a complete service and supply the user of an electric truck not only with current, but with a completely-charged battery, properly filled with distilled water and cleaned, when necessary, of sediment.

This is the system which has been developed during 1915, notably in Hartford, Conn., Boston and Chicago. In these cases the central station goes even farther, and actually sells the vehicle.

Such service, whereby one may drive his truck into a conveniently-located depot whenever desired and receive a charged battery in exchange for a discharged one as easily as one may exchange a Prestolite tank, will doubtless go a long way toward removing one of the greatest deterrents to the more extensive use of electric commercial vehicles. Due to wholesale charging, efficient care and standardized batteries, it should also make them cheaper and easier to operate.

# Standard Tire Sizes

## Fewer Diameters Improve Service to Users

STANDARDIZATION of tire sizes is one of the greatest works of two of the principal associations connected with the motor truck industry in the year past. The Society of Automobile Engineers and the National Automobile Chamber of Commerce have been working together for some time to get tire manufacturers and truck builders to all agree on a few standard sizes of tires so that odd sizes and an unnecessarily large number of regular sizes might be eliminated.

To this end, under date of November 15, 1915, Coker F. Clarkson, general manager of the Society of Automobile Engineers, addressed a letter to all manufacturers of motor trucks, urging them to give both consideration and indorsement to a booklet setting forth the case for a reduced number of standard tire sizes.

This was not the first step in the movement, however, but it is the latest. The S. A. E. undertook the work, with the sanction and co-operation of the N. A. C. C., in 1911. The effort was instanced by the complaints of truck manufacturers who found that the multiplicity of tire sizes made it impossible for tire dealers to carry complete stocks in all cases, and therefore worked a hardship on truck operators which was harmful in its effects. It was also found that tires of identical size of different makes and types were not interchangeable, so that the condition was intolerable.

In 1911 a standard was adopted by the society, embracing forty-two different sizes, 32, 34, 36, 38, 40 and 42 inches in diameter, each diameter having widths of 2½, 3, 3½, 4, 5, 6 and 7 inches. This settled the interchangeability question.

However, even with practically all tires interchangeable, the expansion of the industry brought about new complications. Forty-two sizes were a greater range than many tire dealers could afford to keep in stock, always remembering that tires may not be stored indefinitely.

It was found that many of the minute variations in diameter were unwarranted, and that a difference of 2 inches between sizes was less than practical requirements called for. It was suggested, therefore, that tire diameters be reduced to two, or possibly three, sizes, namely, 36 and 40 inches, and possibly 32 inches also. With the same widths, the 36- and 40-inch diameters only, reduced the number of stock sizes from forty-two to fourteen, eliminating twenty-eight sizes.

#### Only Two Diameters

It is now proposed to eliminate the tentative 32-inch size, since from 75 to 80 per cent of all tires sold are either 36 or 40 inches in size and less than 1 per cent are of 32 inches. Possibly 90 per cent of new trucks are equipped with either 36- or 40-inch tires.

Originally the movement for standard tire sizes was started by truck makers. The new appeal for still further simplification of stocks goes out to truck manufacturers from makers of solid tires, wheels and felloe bands, being signed by officers of the following:

| | |
|---|---|
| Archibald Wheel Co. | Republic Rubber Co. |
| Cleveland Welding & Mfg. Co. | Kelly-Springfield Tire Co. |
| Firestone Tire & Rubber Co. | McGraw Tire & Rubber Co. |
| Gibney Tire & Rubber Co. | Mott Wheel Wks. |
| B. F. Goodrich Co. | Polack Tire & Rubber Co. |
| Goodyear Tire & Rubber Co. | W. K. Pruden Co. |
| Hayes Wheel Co. | Standard Welding Co. |
| Hood Rubber Co. | Swinehart Tire & Rubber Co |
| Imperial Wheel Co. | United States Tire Co. |
| | Universal Welding Co. |

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A. & B. front axle showing driving motors

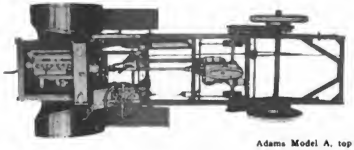
A. & B. 6-ton truck with front drive and drop frame

A. & B. power plant, generator direct - connected with engine

Acme worm-driven 2-tonner

Allis-Chalmers creeper-driven tractor-truck

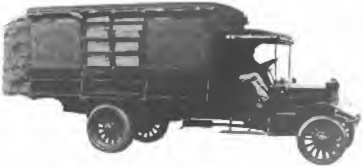
Armleder Bodel B. 1,500-pounder



Adams Model A. top and side chassis views

Autocar two-cylinder power plant

**Double - reduction** driven axle on Autocar chassis showing independent differential mounting



Atterbury 3½-ton worm-driven model

Autocar, showing tilting seat giving access to engine

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# Résumé of Plans and Products of American Commercial Vehicle Manufacturers

# *1916*

## Illustrated Notes on Vehicles and Builders, With Changes in Construction and Methods of Manufacture and Sale Outlined Briefly for Buyers' Information

### Part I—A-F

PRODUCTION in excess of 75,000 trucks is planned by the manufacturers of gasoline motor trucks in the United States for 1916. Starting on this page, THE COMMERCIAL VEHICLE, consistent with its established policy for a number of years, presents the first installment of its annual review of truck manufacturers and their products.

These items are intended to introduce the individual makers to motor truck buyers and the trade, and to set forth the salient features in their business policies as effecting the market generally.

No attempt is made to give a technical description of each product, as complete specifications of all makes will be published in the January 15 issue of this publication. Illustrations, showing the characteristics of the chassis have been used and where technical details of an unusual sort are encountered these are pointed out.

The items are headed, in each case, with the name of the truck, the manufacturer's name, and the capacities in which the vehicles are built appearing immediately below the headings. Arrangement of makes has been carried out alphabetically as far as possible.

## A & B

### 3- AND 5-TON GAS-ELECTRICS

**American & British Mfg. Co., Providence, R. I.**

UNCHANGED in both design and price from the 1915 product, A & B trucks, made by the producers of Amoskeag fire engines, are characterized by the use of gas-electric drive to the front wheels, a low dropped frame and large wheels. A & B vehicles were originally designed as tractors for fire engines, but have been adapted for commercial use by the low goose-neck frame which gives a convenient load platform height. They are made of parts manufactured by the A & B company and are sold mostly in New England.

Both models are of the same design and differ only in the size of the load-carrying parts. The motor-generator set of each model is the same. It is carried on a subframe supported from the goose-neck frame at the front. No standard types of bodies are supplied, each being made to suit the requirements of the purchaser.

## Acason

### A NEW TRUCK—2- AND 3½-TON MODELS

**Acason Motor Truck Co., Detroit**

MAKING ITS DEBUT in 1916, although announced during the last of 1915, the Acason truck is offered in two models, a 2-tonner and a 3½-ton unit, both worm-driven and both following standard truck engineering practice. The Acason truck is an assembled product which will be sold in all parts of the country.

## Acme

### ONE 2-TON WORM-DRIVEN MODEL

**Acme Auto Truck Co., Cadillac, Mich.**

FIRST PRODUCED DURING 1915, the Acme 2-tonner is a worm-driven unit closely following standard practice in design. It is an assembled product sold throughout the United States as well as abroad. Acme trucks are not sold on any form of time-payment plan. It is reported that another model of ¾-ton capacity will be brought out during 1916.

An electric starting and lighting system is furnished as optional equipment. Provisions have been made in the construction of the Acme truck for use with trailers and accordingly the Acme company indorses the employment of trailers where conditions are advantageous.

## Adams

### 1-, 2- AND 2½-TON MODELS

**Adams Truck Foundry & Machine Co., Findlay, O.**

SOLD IN THE NORTHEAST, central west and along the Pacific coast, Adams trucks for 1916 are offered in the same number of models as in 1915, of the same design and at the same price. They remain double-chain-driven and are still characterized by the use of a sloping hood hinged to the front of the dash which permits of easy access to the motor when swung upward. The braking system of the 1916 trucks has been completely redesigned.

Departing from previous practice, the Adams company is working on the design of a 3-ton worm-driven model which will be ready for delivery about April 1. The Adams company underwent a reorganization during 1915 and as a result changed its name from the Adams Bros. Co. to that given at heading of this article.

The Adams truck is an assembled product which is sold on a time-payment plan to reputable concerns which can furnish bankable paper. It is marketed either with or without body, the Adams company preferring to sell the stripped chassis.

No electric starting or lighting system is provided on the trucks, the Adams company holding the belief that such equipment is not practical in the great majority of cases owing to the poor care given it by the average driver. The Adams company indorses the use of trailers with its vehicles.

## Allis-Chalmers

### TRACTOR-TRUCK OF CREEPER TYPE

**Allis-Chalmers Mfg. Co., Milwaukee, Wis.**

DRIVING through creeper units of the track-laying type, the Allis-Chalmers motor-driven tractor-truck made its bow to the motor truck industry in 1915. It is manufactured by one of the largest and best-known machinery-making companies in the world. It is a development of the slow-moving track-laying traction engines. It is particularly adapted for hauling loads over rough country.

Its ability for negotiating rough country is secured by the great traction of the pivoted track-laying devices and large steel wheels at the front carried on an axle pivoted to the front end of the frame. The latter is straight-sided from the rear to the front of the motor hood, where it is bottle-necked and extended forward for a distance equal to the radius of the front wheels. This, with the pivoted axle, permits the wheels to turn at great angles to the vehicle centerline, as when negotiating steep embankments, without fouling the frame.

Although the unit can be advantageously used as a conventional type of truck, its great field is in the hauling of trailers, due to its great tractive effort on account of its unusual rear system.

## Armleder

### TWO WORM- AND TWO CHAIN-DRIVEN MODELS

**O. Armleder Co., Cincinnati, O.**

HERETOFORE sold only within a radius of 100 miles from Cincinnati, Armleder trucks will be offered for sale all over the United States during 1916. This will be accomplished by the appointing of agents in all of the principal cities. The 1916 line includes seven models in all, an increase of four over 1915. Last year a 1-ton bevel-driven model and 1½- and 2-ton double-chain-driven types composed the line. This year the 1-ton bevel-driven model has been dropped and 1-ton worm-driven and internal-gear-driven models substituted. These will be on the market February 1.

The 2-ton chain-driven model has been continued and a worm-driven type of the same capacity and one of 3½ tons burden added. Forty-inch wheels formerly used on all Armleder vehicles have been abandoned for 36-inch sizes.

Armleder trucks are an assembled product. They are sold on time locally only, and then one-third of the chassis price must be paid on order with the balance in eight monthly payments. Deferred payments bear interest at 6 per cent and are covered by a mortgage on the chassis.

The Armleder company, long established in the horse wagon industry, carries a line of fifteen standard motor truck bodies and for this reason practically all trucks are sold with bodies. Bodies are

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Available 2-tonner, worm-driven

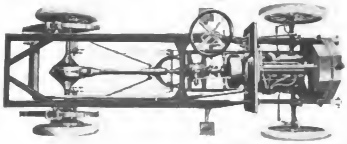
Avery 3-tonner, farm truck chassis

Avery 3-ton American type chassis

Blair 3-tonner, worm-driven, with motor between seats

2-ton Brockway with worm drive

Worm-driven Bessemer 3½-tonner



Buick chassis and side view, 1,500 pounds capacity bevel drive

2-ton Burford, internal-gear driven

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not included in time-payment purchases and are sold for cash only. The Armleder company anticipates bring in position to furnish electrical starting and lighting equipment on its vehicles by March 1. Armleder trucks may be used in connection with trailers.

## Atterbury

### THREE WORM-DRIVEN MODELS

**Atterbury Motor Car Co., Buffalo, N. Y.**

DROPPING its 1,500-pounder and 5-ton chain-driven model of 1915, the Atterbury company's 1916 line consists of three models of 1, 2 and 3½ tons capacity, all worm-driven. Atterbury trucks are an assembled product and are sold nationally. They are produced as chassis, bodies built in the Atterbury factory to suit the purchaser.

The Atterbury design follows accepted engineering practice. The prices of the 1916 models are slightly less than those of 1915.

## Autocar

### ONE UNCHANGED 2-TONNER

**Autocar Co., Ardmore, Pa.**

REDUCED $200 IN PRICE, the 1916 Autocar is essentially the same as last year. It is made in but one model of 2 tons capacity and is characterized by its short wheelbase, horizontal double-opposed motor under the seat, hickory frame reinforced with steel and double-reduction final drive. It is practically the same vehicle as announced by the Autocar company in September, 1913, except for refinements of detail and a strengthening of parts which changed its capacity from 1½ to 2 tons.

Autocars are made from parts manufactured by the Autocar company. They are sold in all parts of the world and may be purchased on a time basis with a substantial first payment with the balance in monthly 6 per cent notes.

A new dumping body has been added to the line of standard bodies which the Autocar company carries in stock. Autocars are not recommended for use with trailers.

## Auglaize

### TWO BEVEL-DRIVEN ¾-TONNERS

**Auglaize Motor Car Co., New Bremen, O.**

CONTINUED FROM 1915, the Auglaize line consists of two ¾-ton bevel-driven models, one of which has a two-cylinder motor and the other a four-cylinder type. The motors of both models are located under the seats.

Auglaize trucks are assembled from components purchased from makers of standard parts. They are sold throughout the United States, but not on any time-payment plan. Electric starting and lighting equipment is furnished as an option.

The Auglaize company also manufactures steel dumping bodies for its trucks and 1,000- to 1,500-pound two-wheeled trailers.

## Avery

### THREE TRUCKS AND FARM TRACTOR

**Avery Co., Peoria, Ill.**

ENTERING BUSINESS 8 years ago with the first four-cylinder motor truck placed on the American market, it is claimed, the Avery company still makes that vehicle as its farm truck. In addition, it carries over for this year without change its 1915 line of 2-, 3- and 5-ton trucks with motors under the floors. It also manufactures a farm tractor in five sizes.

The Avery company is also expected to continue the marketing of the Glide, a 1,500-pound delivery car, for the Bartholomew Co., also of Peoria.

## Available

### THREE MODELS—1 TO 3½ TONS

**Available Truck Co., Chicago**

ALL WORM-DRIVEN, the Available line for 1916 includes the 1- and 2-ton models of last year, together with a new unit of 3½ tons capacity, all following standard designing practice. All three models are assembled from standard parts.

The sales of Available trucks are made almost entirely in Chicago.

## Barker

### 1- AND 2-TON MODELS WORM-DRIVEN

**C. L. Barker, Norwalk, Conn.**

BARKER trucks for 1916 are the same as those of 1915 in every respect, including price. The line consists of 1- and 2-ton models, worm-driven and following accepted standard practice in design, except the 1-tonner, which employs 42-inch wheels all around.

Barker trucks are sold almost exclusively in New England. The great majority are sold complete with bodies. They are guaranteed for use in connection with trailers.

## Bell

### 1,200-POUND DELIVERY CAR

**Bell Motor Car Co., York, Pa.**

NEW IN 1915, the Bell 1,200-pound delivery car, mounted upon the same chassis as the Bell passenger car except that it has a lower gear-ratio and a different type of ignition system, is continued for 1916 without change.

It is made in a 112-inch wheelbase with bevel drive.

## Bauer

### ½- AND ¾-TON DELIVERY CARS

**Bauer Machine Wks. Co., Kansas City, Mo.**

REDUCTION IN PRICE is the most conspicuous change in Bauer trucks for 1916, which with that exception are without change as compared to the 1,000- and 1,500-pound models offered in 1915. The price of the ½-tonner has been reduced $180 and that of the ¾-tonner, $310.

A feature of the Bauer design is the use of a double-reduction rear axle. Bauer vehicles are equipped with motors, clutches and gearsets made by the Bauer company, whereas other component parts are purchased from specialists in each particular line. The sale of Bauer trucks is local to Kansas City and its surrounding territory.

## Brasie

### 600-POUND DELIVERY CAR

**Brasie Motor Car Co., Minneapolis, Minn.**

ONE MODEL of the 1915 line, the Brasie Packet of 600 pounds capacity, is continued for 1916 without change and under the same name, while the two 2-ton models of 1915 are still sold as Twin City trucks. The Packet is especially designed for light work, such as package delivery. It has friction drive and is assembled from standard parts. It is sold throughout the United States. Except in rare cases, the Packet is sold complete with body.

The Brasie company also manufactures the Brasie trailer for use with the Packet or with standard passenger cars. The trailer is of the two-wheeled type with wire wheels, pneumatic tires and long flat semi-elliptic springs.

## Bollstrom

### ONE FOUR-WHEEL-DRIVEN ¾-TONNER

**Bolstrom Products Sales Co., Battle Creek, Mich.**

FIRST PRODUCED IN 1915, the 1916 Bollstrom line consists of one model of 1,500 pounds capacity, internal-gear-driven on all four wheels. It is a special product, practically all parts of which are made by the Bollstrom company. It is to be sold throughout the United States.

The Bollstrom truck is equipped with an electric lighting, starting and ignition unit. Due to the use of the four-wheel-drive principle, the Bollstrom truck is applicable to use in connection with trailers.

## Brinton

### 1,200-POUND AND 2½-TON MODELS

**Chester County Motor Co., Coatesville, Pa.**

BROUGHT OUT IN 1915, the Brinton truck is made in two models, one 1,200-pounder for light work, and a 2½-ton unit, both worm-driven and both otherwise following standard truck practice in design. Both models are assembled products which are to be sold nationally. Brinton trucks may be purchased on a time-payment plan with a small initial payment and the remainder in bankable notes.

Brinton vehicles are equipped with electric lighting systems as standard parts, but not with starters.

## Bessemer

### FOUR MODELS—¾ TO 3½ TONS

**Bessemer Motor Truck Co., Grove City, Pa.**

DROPPING its 1-ton chain-driven truck of 1915, the Bessemer company's 1916 line includes two new models, a ¾-ton internal-gear-driven truck and a 3½-ton worm-driven model. The 1½-ton chain-driven model of 1915 is continued without change. The 1915 worm-driven 2-tonner is also continued without change except in price, which is reduced $300.

Bessemer trucks are an assembled product which is sold throughout the United States. The Bessemer company offers no form of time-payment plan for the purchase of its vehicles. If desired, provision is made for the use of Bessemer trucks in connection with trailers.

## Blair

### FOUR MODELS, ALL WORM-DRIVEN

**Blair Motor Truck Co., Newark, O.**

CONTINUED FROM 1915 without change, the Blair line consists of four models of 2, 3, 4 and 5 tons capacity, all worm-driven. Blair trucks are characterized by a rigid sub-frame attached to the frame at two points in front and at one point on the rear axle. This sub-frame carries the motor and the entire transmission.

Blair trucks are assembled from standard parts and are sold nationally. The Blair company supplies pneumatic hoisting gears and dumping bodies on its heavier models. Blair trucks are guaranteed for use with trailers under certain conditions.

## Brockway

### WORM AND CHAIN 1¼- AND 2-TONNERS

**Brockway Motor Truck Co., Cortland, N. Y.**

CONTINUING its 1915 double-chain-drive models of 1¼- and 2-ton capacity without change except for a very slight increase in price, the Brockway company has added two worm-driven models of the same capacities. The 1,500-pound chain-driven model of 1915 has been dropped. The French hoods formerly employed have been abandoned and on the new models the cast-case finned-tube radiators are located in the conventional place.

Brockway trucks are an assembled product and are sold nationally. The Brockway company does not sell its vehicles on any form of time-payment plan. Most Brockway trucks are sold complete with bodies, as the company maintains its own body-building shops.

Electric starting and lighting systems are not indorsed by the Brockway company, although it will so equip its trucks if the purchaser desires. Provision has been made for the use of Brockway vehicles with trailers.

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## Buick

### ONE 1,500-POUND MODEL

**Buick Motor Co., Flint, Mich.**

CONTINUED WITHOUT CHANGE, the Buick light delivery vehicle, produced by the maker of Buick passenger cars, is made almost entirely in the Buick plant. It is sold in every state in the Union, but not on any form of time-payment plan.

It follows standard design, except that the motor and gearbox are mounted on a sub-frame which may be quickly dismounted from the main frame. The vehicle is sold either in the chassis or with an open express body. The Buick truck is equipped with an electrical starting, lighting and ignition system. The Buick company indorses the use of trailers but makes no provision in the Buick truck for their use.

## Burford

### 2- AND 3½-TON MODELS

**H. G. Burford Co., Fremont, O.**

BURFORD trucks are made in two models for 1916. One, a 2-ton internal-gear-driven model, formerly known as the Fremont-Mais, is continued from 1915 with changes which consist of an increase in price and the use of a selective gearset instead of one of the progressive type. The 3½-ton model, worm-driven, is new. The Burford company was formed in 1915, taking over the plant of the Lauth-Juergens Motor Car Co., in Fremont, O.

Burford trucks are an assembled product which is sold throughout the United States and also abroad. The axles and jackshaft of the internal-gear-driven model are of Burford manufacture.

## Columbia

### NEW TRUCK OF 2-TON CAPACITY

**Columbia Motor Truck & Trailer Co., Pontiac, Mich.**

FORMERLY THE KALAMAZOO, the Columbia 2-tonner, now produced by the Columbia Motor Truck & Trailer Co., Pontiac, Mich., successor to the Kalamazoo Motor Truck Co., Kalamazoo, Mich., is an entirely new vehicle. It retains something of the Kalamazoo appearance but the drive is by internal gears instead of by chain, as formerly.

The Columbia truck is an assembled product sold to the central and eastern states and in Europe. The Columbia company also manufactures four-wheeled trailers for use with its trucks.

## Chase

### THREE MODELS FROM ½ TO 3½ TONS

**Chase Motor Truck Co., Syracuse, N. Y.**

CHASE trucks for 1916 are all worm-driven and all have water-cooled motors, the old chain-driven Chases with air-cooled motors having been closed out entirely. The line consists of 1-, 2- and 3½-tonners, all following the same general design. Chase trucks are assembled partly from standard parts and are sold nationally and abroad. The Chase company does not approve selling its vehicles on time payments unless the purchaser can supply notes considered desirable by a bank. Practically 60 per cent of Chase trucks are sold as stripped chassis.

At the present time, Chase trucks are not equipped with electrical starting or lighting systems, although they may be so equipped at extra charge. The Chase company guarantees the use of its trucks with trailers only after investigating the conditions under which they are to operate.

## Continental (C)

### FOUR MODELS OF 1 TO 3½ TONS

**Continental Motor Truck Co., Chicago**

MAKING ITS DEBUT in 1915, the Continental truck of Chicago, one of two trucks of the same name on the 1916 market, is offered in four models of 1, 1½, 2 and 3½ tons capacity. Each model follows the same general design and all are worm driven.

Continental of Chicago trucks are partly assembled and partly manufactured. They are sold mostly in Chicago and the west.

## Continental (S)

### OPTIONAL DRIVE ON 1½- AND 3-TONNERS

**Continental Truck Mfg. Co., Superior, Wis.**

CONTINUING last year's line, the Continental company of Superior, Wis., offers two models, one of 1½-ton capacity and one of 3 tons burden. Each model is furnished with either worm or chain drive. Both models are of similar arrangement, size and appearance, having the motor under the hood with right steer and right control.

Continental of Superior trucks are an assembled product sold mostly in Wisconsin and adjacent states.

## Coleman

### ONLY TWO 1916 MODELS

**F. Coleman Carriage & Harness Co., Ilion, N. Y.**

ADDING a new 2-ton worm-driven model and dropping its 1915 1-ton chain-driven unit, the Coleman company has carried over its 1915 3-ton chain-driven model without change, thus giving a two-vehicle line for 1916. Both models are of the same general design, except the final drive, and have their motors under the seats.

Coleman trucks are partly assembled from standard parts and partly from parts manufactured at the Coleman plant. They are sold mostly in upper New York state. The Coleman company does not indorse selling its trucks on time payments but will do so when proper security is offered, exacting from 25 to 50 per cent of the total cost in an initial payment and the balance in monthly notes bearing 6 per cent. Coleman trucks are not indorsed for use with trailers.

## Commerce

### ONE 1,500-POUND DELIVERY CAR

**Commerce Motor Car Co., Detroit**

EXCEPT FOR A NEW MOTOR and a slightly longer wheelbase, the Commerce 1,500-pound delivery car remains the same as in 1915, including the price. It is an assembled product and is sold throughout this country and by agents in Great Britain, Australia, New Zealand, France, India and South Africa.

Commerce trucks are not sold on time by the Commerce company, although several dealers have sold them on a part-payment plan which consisted of 25 per cent of the purchase price with the order and the balance in twelve monthly notes bearing 6 per cent.

An electrical starting and lighting system is furnished as extra equipment and at extra cost.

## Couple-Gear

### 3½- AND 5-TON GAS-ELECTRICS

**Couple-Gear Freight Wheel Co., Grand Rapids, Mich.**

EXCEPT for a reduction of $50 in the price of the 3½-ton unit and $200 in the price of the 5-tonner, Couple-Gear gas-electric trucks are the same as in 1915. The salient features of each model are the gas-electric drive and four-wheel drive and steer. The Couple-Gear company also makes electric trucks in which the current is obtained from storage batteries instead of from a generator driven by a gasoline engine.

Both are manufactured products sold principally in New England, New York and California.

The 3½-ton unit is a self-contained truck, while the 5-tonner is a four-wheeled tractor. Both follow the same general design. The motors drive direct-connected electric generators, both being mounted in units in each case and carried on three-point sub-frames. The final drive is by individual electric motors inclosed within steel disk wheels. The armature shafts are vertical and have bevel pinions on each end which drive the wheels through internal bevel teeth on the wheel felloes. An electric lighting system, but no starting unit is furnished on each model.

## Corbitt

### 1- AND 2-TON MODELS

**Corbitt Automobile Co., Henderson, N. C.**

TWO BRAND NEW MODELS of Corbitt trucks are the 1916 offering of the Corbitt Automobile Co., one of the few commercial vehicle builders in the south. The 2,500-pound chain-driven model of 1915 has been discontinued and the line now consists of a 1-tonner and a 2-tonner, both worm driven.

Corbitt trucks are designed particularly for conditions in the territory in which they are made and where they are principally sold. They may be bought for an initial payment of 33 1/3 per cent, with the balance in nine monthly payments.

Both of the new models are assembled products of similar design and appearance. They are sold as chassis generally, the Corbitt company carrying no standard bodies in stock, although it builds special types on order. The Corbitt company indorses the use of trailers.

## Croce

### THREE MODELS, ½- TO 2½ TONS

CONSISTENT with the change of final drive from double-chain to worm made by the Croce company for 1915, this year's line is also worm-driven except for a new ½-ton model which is direct-bevel-driven. The complete Croce line consists of the ½-ton unit and 1½- and 2½-tonners, both worm-driven. The 3½- and 5-ton chain-driven models carried last year are not made for 1916.

Following Croce precedent, the 1½- and 2½-tonners differ from standard practice in that their motors are placed between the seats. The ½-ton unit, however, has its motor under a conventional hood forward of the dash. Another departure from standard practice is the use of Cupid's bow springs.

Croce trucks are partially-assembled products. They are sold sectionally.

## Crawford

### ONE 3-TON CHAIN-DRIVEN MODEL

**Crawford Automobile Co., Hagerstown, Md.**

ONE MODEL of 3-ton capacity continues to be the offering of the Crawford company for 1916. The truck is of standard construction with motor under a hood, a 144-inch wheelbase and double-chain drive from a jackshaft and gearset located amidships.

The Crawford truck is an assembled product and one of the few commercial vehicles made in the state of Maryland. It is sold principally in that state.

## C. T.

### THREE GAS-ELECTRIC MODELS

**Commercial Truck Co. of America, Philadelphia, Pa.**

ENTERING THE GASOLINE FIELD for the first time in 1915 with a four-wheel-driven gas-electric tractor, the Commercial Truck Co. of America continues this model for 1916 and has added two other truck models, one of 3½ tons capacity and the other of 5 tons. All three models follow the same general design, employing gasoline motors which drive directly to generators which furnish current to four motors mounted on the front and rear axles in each case, these driving each wheel by internal gears.

C. T. trucks are assembled both from parts made at the C. T. plant and from those made by part spe

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Chase 2-tonner with worm drive

Bevel-driven Commerce 1,500-pounder

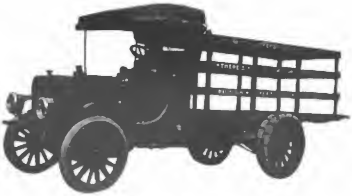
Continental worm-driven 2-tonner

Croce with motor between seats and worm drive

Couple-Gear gas-electric, four-wheel drive, steer and brake tractor and semi-trailer

Crown 1-tonner, worm-driven with steel wheels

Columbia internal-gear-driven 2-tonner



Corbitt southern-built 2-tonner

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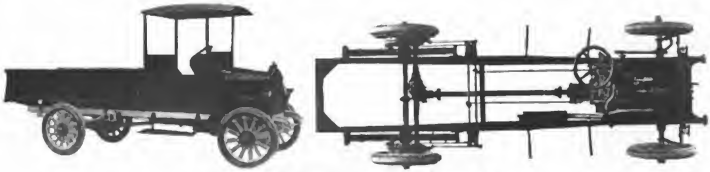


Denby 1-ton internal-gear-driven model, side and chassis views

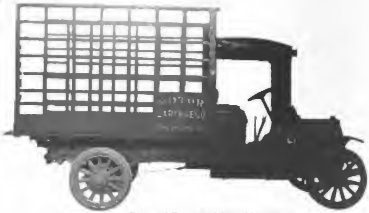
Curtis 3-tonner, American type

Dart ½-tonner on pneumatics

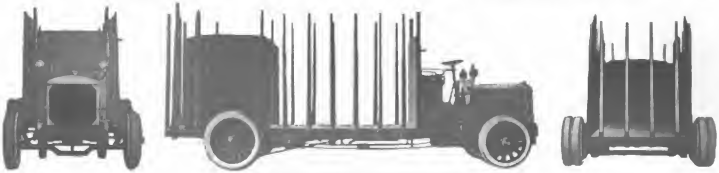
Dayton 4-ton type with motor under seat

DeKalb 2-tonner

Detroit ½-ton package car



Diamond-T worm-driven 1½-tonner



Doane low-bed 6-tonner, a Pacific Coast product

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cialists. They are sold mostly in the eastern part of the United States. Both of the truck models are adaptable for trailer use. The tractor is designed especially for that purpose, carrying a fifth-wheel for semi-trailer use. The tractor can support 5 tons of the semi-trailer load.

## Crowther

### NEW 1,000-POUNDER

**Crowther Motor Co., Rochester, N. Y.**

FORMED IN 1915, the Crowther company offers one model of 1,000-pound delivery car for 1916. The vehicle is designed especially for light package delivery work and is characterized by the patented roller drive of Charles E. Duryea. It differs from previous Duryea vehicles in that it has a four-cycle motor under the hood instead of a two-cycle type under the body.

It is partly assembled and partly manufactured and is sold principally in the east.

## Crown

### ¾-, 1½ AND 2½-TON MODELS

**Crown Commercial Car Co., North Milwaukee, Wis.**

THREE MODELS comprise the 1916 Crown line, which is continued from 1915 without change. It consists of a 1,500-pound light delivery vehicle and trucks of 1½- and 2½-ton capacities, all worm-driven.

The heavier models are characterized by advanced construction throughout, having flexible steel frames, steel wheels and worm drive with the torque and propulsion taken through the springs. They also use cast-case radiators with vertical finned tubes and have left steer and center control.

The lighter model differs in that it uses a passenger car type of radiator, wood wheels and pneumatic tires. All three models are assembled from standard parts. They are sold in the middle west.

## Curtis

### 2- AND 3-TON CHAIN-DRIVERS

**Pittsburgh Machine Tool Co., Braddock, Pa.**

TWO MODELS, a 2-tonner and a 3-ton unit, both chain-driven, comprise the Curtis line this year, which has been carried over from as far back as 1913 practically without change except for minor details of construction. Both models are of the same general design with the motors under the floors. The motors are of the block type and have automatic spark advance. Right steer with right control is employed. Curtis trucks are partly assembled and partly manufactured. They are sold mostly in Pennsylvania.

## Dain

### 1-TON DELIVERY VEHICLE

**Dain Mfg. Co., Ottumwa, Ia.**

CHARACTERIZED by its worm and friction drive, the Dain 1-ton delivery vehicle is continued from 1915 with practically no changes. Its motor is placed between the seats and drives through a special friction change-gear to a worm-driven axle. The change-gear consists of a cone clutch in the flywheel with the cone member keyed to the propeller shaft so that it can be moved forward and backward along the shaft. The flywheel bears against two paper-tired friction disks at its rear wheels in turn drive the paper-tired cone. The disks are set obliquely to the horizontal, slanting towards each other at the bottom.

For direct drive the cone member is in contact with the flywheel, as ordinarily, but for low, intermediate, neutral and reverse speeds it is withdrawn and the wheel slid across the faces of the disks. The Dain vehicle is largely a manufactured product and is sold in Iowa and adjacent states.

## Dart

### THREE NEW MODELS FOR 1916

**Dart Motor Truck Co., Waterloo, Ia.**

DART trucks are made in six models for 1916, of which three are carried over from 1915 without change and three are brand new types. The latter consist of a 750-pound light delivery vehicle sold complete with body; a 1,500-pound worm-driven truck, and a 2½-ton unit, also worm driven. The models carried over from 1915 consist of a bevel-driven 1,000-pounder and two chain-driven models of 1- and 2-ton capacity.

Dart trucks are sold throughout the United States and also abroad. They may be bought on a time-payment plan in which one-third the purchase price is paid in cash and the balance in ten equal monthly installments covered by a chattel mortgage and a fire insurance policy.

They are assembled from standard parts only. Only the 750-pound model is sold complete with body. This model is also equipped with an electric starting, lighting and ignition system. This equipment is optional on the other models. The use of trailers with Dart trucks is recommended when the load is light, bulky or long, such as empty tin cans, empty boxes or long pieces of lumber or trim.

## Dayton

### FOUR MODELS, 1 TO 7½ TONS

**Durable Dayton Truck Co., Dayton, O.**

EMBRACING FOUR MODELS, the Dayton offering for 1916 includes chain-driven types of 2, 3½, 5 and 7 tons capacity. The 1½-ton model of 1915 has been dropped. A characteristic of all models is the position of the motor under the seats.

Dayton trucks are partly assembled and partly manufactured. They are sold nationally and abroad and may be purchased on time payments when the notes given as security are indorsed by reputable concerns. They are also guaranteed for use in connection with trailers.

## De Kalb

### TWO MODELS WITH OPTIONAL DRIVE

**De Kalb Wagon Co., De Kalb, Ill.**

OPTIONAL worm or chain drive at the same price is the most important change in De Kalb trucks for 1916 and which otherwise are practically the same as the 1915 models. They are an assembled product which is sold mainly in Illinois, Iowa and Wisconsin. They may be purchased on several monthly installments provided a substantial initial cash payment is made when the vehicle is ordered.

The motors of Da Kalb trucks are suspended on a three-point subframe. The truck frame is of the flexible type with but three cross members. It is dropped just forward of the rear axle, bringing the center of weight closer to the ground. The De Kalb company does not indorse the use of electric starters. It furnishes equipment for both electric and gas lighting. De Kalb trucks are guaranteed when used with trailers.

## Denby

### FOUR MODELS INTERNAL-GEAR-DRIVEN

**Denby Motor Truck Co., Detroit**

INTERNAL-GEAR DRIVE, a reduction in the price of the three models carried over from 1915, and a new ¾-ton model, the first one of which was delivered in October, 1915, are the outstanding characteristics of the Denby line for 1916. The new ¾-tonner is sold complete with body. A feature of all Denby trucks is the position of the gasoline tank on the dash. The complete line consists of internal-gear-driven models of ¾, 1, 1½ and 2 tons capacity. They are an assembled product which is sold nationally and also abroad.

## Detroit

### ONE 1,000-POUND MODEL

**Detroit Commercial Car Co., Pontiac, Mich.**

DESIGNED for package delivery work, the Detroit 1,000-pounder, new in 1915, is continued for 1916 without change. It is assembled from standard parts and is to be sold throughout the United States.

Detroit vehicles employ an electric starting, lighting and ignition unit. They may be also used in connection with light two-wheeled trailers for bulky loads. They are not sold on any form of time-payment plan.

## Diamond-T

### FOUR MODELS, ALL WORM-DRIVEN

**Diamond-T Car Co., Chicago**

DIAMOND-T trucks are to be sold in all parts of the United States during 1916, whereas in the past the Diamond-T company has confined its efforts principally to Chicago and its environs. The complete line consists of five models, all worm-driven, in ¾-, 1-, 1½-, 2- and 3½-ton sizes. The ¾-ton unit was new in 1915 and is carried over without change.

The Diamond-T company built passenger cars and trucks 9 years ago and was the first concern to put a 1½-ton worm-driven truck on the American market, it is claimed. This model has undergone practically no changes since that time. The Diamond-T truck is assembled from standard parts.

## Dispatch

### ONE MODEL, A 1,200 POUNDER

**Dispatch Motor Car Co., Minneapolis, Minn.**

CONTINUED from last year without change, the Dispatch 1,200-pound light delivery vehicle is characterized by a friction change-gear incorporated with the jackshaft and inclosed side-chain drive.

Dispatch vehicles are manufactured at the Minneapolis plant with the exception of the motors, which are purchased from a specialist in that field. They are offered by agents in twenty-six states, from Vermont to Florida and from Washington to Texas. The Dispatch company furnishes an electric starting and lighting unit on its vehicle as optional equipment. The company also indorses the use of trailers with its vehicles, but makes no standard provision for their attachment.

## Doane

### 6-TON MODEL WITH LOW FRAME

**Doane Motor Truck Co., San Francisco, Cal.**

ONE MODEL of 6 tons capacity with a low platform for trucking purposes on the Pacific coast is the Doane offering for 1916. It is practically the same as the one model offered in 1914 and 1915. It has a low dropped frame and cranked axles which permit the load platform to be as near the ground as is those of the horse wagons used for trucking in the California territory.

Heretofore the Doane truck has been made for a small trade along the western coast, but plans are now under way for production in greater quantity.

## Dorris

### ¾- AND 2-TON MODELS

**Dorris Motor Car Co., St. Louis, Mo.**

DORRIS trucks are offered in two models of 1,500-pound and 2-ton capacity. They are the same as in 1915 except that the final drive

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of the larger model has been changed from double chain to worm, the price remaining the same, while the price of the 3½-tonner has been reduced $50. Both models are partly manufactured and partly assembled. They are sold in the western and Pacific states.

The Dorris company has been in the passenger car business for more than a decade and has manufactured its present line of trucks, with the exception of minor refinements and the change to worm drive on its 1916 2-tonner, since 1911.

## Duryea

### ROLLER-DRIVEN 1,000-POUNDER

### Duryea Laboratories, Philadelphia, Pa.

CONTINUED from 1915 without change, the Duryea 1,000-pound delivery vehicle is characterized by a two-cylinder air-cooled motor directly connected to the jackshaft, which is just forward of the rear axle. On each end of the jackshaft are positioned a set of rollers which contact with either one of two grooved circular rings of different diameter bolted to the rear wheel spokes. Moving either one of the two jackshaft rollers into contact with the larger diameter ring gives the changes in forward speed, while moving the smaller roller into contact with the smaller wheel ring gives the reverse speed. This type of drive is the invention of Charles E. Duryea.

## Duplex

### EIGHT-SPEED GEARSET ON 2-TONNER

### Duplex Power Car Co., Charlotte, Mich.

FORMERLY made in but two models of 2 and 3 tons capacity, both internal-gear-driven on all four wheels, Duplex trucks are offered in three models for 1916. The newcomer, of 2-ton capacity, is characterized by an eight-speed gearset with two reverse speeds. The gearsets of the two models carried over from 1915 have been changed from the three-speed to the four-speed type.

The drive of the Duplex truck is from the clutch and gearset unit, bolted to the motor, to a point amidships where gears transmit it to the driveshafts which extend forward and aft to internal-gear-driven front and rear axles. Duplex trucks are guaranteed for use with trailers.

## Dominion Tractor

### ONE 6-TON WORM-DRIVEN MODEL

### Dominion Motor Truck Co., Detroit

ORIGINALLY located in Canada, the Dominion Motor Truck Co. moved its plant to Detroit in 1915 and brought out its first stock model of a gasoline tractor. It is of the four-wheeled type and characterized by its short wheelbase, motor between the seats and final worm drive.

The Dominion tractor is an assembled product which at the present time is sold locally to Detroit.

## Falcon

### A 1,000-POUNDER

### Falcon Motor Truck Co., Detroit

NEW IN 1915, the Falcon 1916 offering has undergone no change and consists of a light, pneumatic-tired 1,000-pounder designed for package delivery work. The Falcon truck is an assembled product which will be placed on sale all over the United States and abroad. Falcon trucks are furnished with either left or right steer.

## Fargo

### INTERNAL-GEAR-DRIVE 1- AND 2-TONNERS

### Fargo Motor Car Co., Chicago

AN ASSEMBLED PRODUCT sold mostly in Chicago and its environs, the 1916 Fargo trucks are offered in two models, one 1-tonner and one 2-ton unit, both internal gear driven. They may be purchased on time by responsible buyers with an initial cash payment of 25 per cent and the balance in equal monthly instalments.

Fargo trucks are generally sold complete with bodies. An electric lighting and starting system is furnished as extra equipment.

## F. W. D.

### 1½, 3- AND 5-TON FOUR-WHEEL DRIVEN MODELS

### Four Wheel Drive Auto Co., Clintonville, Wis.

FOUR WHEEL DRIVE trucks for 1916 are practically the same in every detail as those offered in 1915, except the price of the 1½-ton model which has been increased $200. All three models follow the same general design with the drive taken through all four wheels and the motors under the seats.

F. W. D. trucks are partly assembled and partly manufactured.

## Federal

### 1½- AND 3½-TON WORM-DRIVEN MODELS

### Federal Motor Truck Co., Detroit

DROPPING its 1½-ton chain-driven model of 1915 but retaining its worm-driven truck of the same capacity, the Federal company offers in addition a 3½-ton worm-driven unit for 1916. Each model is an assembled product with the exception of a few minor parts which are made in the Federal factory.

Federal trucks are offered for sale in every state in the Union and also in Europe. The Federal company does not sell its trucks on any form of time payment, although many of its dealers have such plans and many Federal trucks have been sold by them in that manner.

## Bostonians Enthusiastic Over Motorized Mail

BOSTON, MASS., Dec. 20—Postmaster William F. Murray arranged to have his delivery system in such good working order this year that there would be no delays and few kicks over the service in handling Christmas mail. To bring that about he had all the motor trucks brought to the Post Office where the packages are loaded up and had the drivers and their helpers on hand to give them a bit of advice. This was on Sunday when there was no traffic and everything was quiet. Assistant Postmaster Hurley and Superintendent of Mails McGrath were also present at the conference and they talked to the men. The talks were more in the spirit of co-operation, and the drivers and assistants were asked for ideas which might be worked out to aid in facilitating the work.

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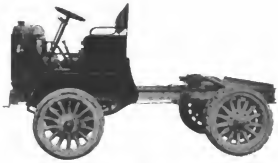
Dorris 2-ton worm-driven model with valve-in-head motor

Four-wheel internal-gear-driven Duplex 2-tonner

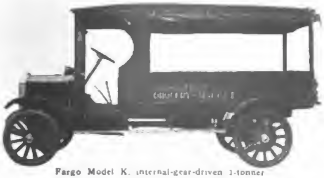
Two views of Dorris unit power plant



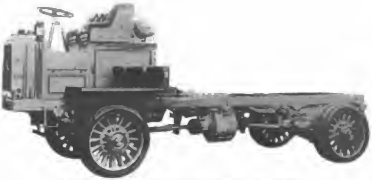
Dominion close-coupled worm-driven tractor

3½-ton worm-driven Federal truck

Federal 1½-ton model



Fargo Model K, internal-gear-driven 1-tonner



F. W. D. 3-ton bevel-driven four-wheel-driven chassis

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## Precious Ignorance

WHERE did the national administration acquire the novel principle of taxation of necessities for federal revenue? It has always been the principle in this country before to tax luxuries when necessary for more governmental income. Or perhaps the federal government has not yet recognized the motor truck as a necessity, as an economy and not a luxury. Perhaps in proposing a national tax on gasoline the administration forgot all about the motor truck.

To argue for the exemption of the motor truck from the category of taxable luxuries is by no means to grant the justice or expediency of a tax on gasoline, but before much more is said or done about the threatened levy on America's most growing industry, it is well to point out the essential distinction between a tax on motor fuel for passenger vehicles and one on those of the commercial sort.

No one proposes a tax on the coal burned in locomotives or under heating, lighting and stationary power boilers, for these are considered necessities. No one proposes a levy on hay and oats, for these are necessities to the horse, in turn a necessity to many citizens in the conduct of their daily business.

Why then single out the motor truck, simply because it is operated by a gasoline motor similar to that used in passenger cars, for taxation as a luxury, an extravagance. If it is extravagant to haul from three to four times as much goods in a day in less time and at less cost than by any other known means; it cleanliness, economy of traffic space, and avoidance of the enslavement of noble dumb beasts is indulgence in luxury, then let us have a gasoline tax applied to all motor vehicles. But by all the dictates of reason, let us not stop there.

Let us tax all labor-saving and efficiency-increasing appliances of economy. Let us tax the farmer for his use of improved implements, such as binders, threshers, gang-plows, grain drills, etc. Why exempt the electric vehicle from the levy? If gasoline such as used in motor boats is to be taxed, then why not also the crude oil and coal used in steam vessels?

——After all, is it a question of reason? Does the administration need to put forth logic in support of its proposition? The motor vehicle industry is one of the best advertised in the world. It has talked too much about its own prosperity. It is not credited with much political influence. It is ignorantly classed as a caterer to luxury through its own mistake of telling the public about its prosperity instead of about its potentialities for making the public more prosperous.

## Happy New Year

**READERS of THE COMMERCIAL VEHICLE have its very best wishes for a happy and prosperous new year.**

**All of the sincerest and most cordial wishing in the world, however, will make it neither happy nor prosperous. There is no luck about either**

**Much of the success which is attained by men in modern commerce and industry is the result of faithful and intelligent work along a particular plan, laid out in advance. Plans which result in ultimate success are not laid in haste or on a basis of guesswork.**

**Accurate and precise information is as essential to good planning as firm and evenly-placed foundations are to the security of a framework.**

**Now, at the beginning of the new year, everyone in and out of the commercial vehicle industry is at his busiest, yet it is the very time—at the start of things—that the most mature thought and study is desirable. There is only one time to plan correctly and that is before acting. That is now.**

**Nothing better can be found for the motor truck owner, dealer and manufacturer than a diligent perusal of the pages of this magazine, particularly those of the next issue, which will be devoted to the mechanical trends and developments of the year.**

**They have been prepared with the express wish that they may contribute to the happiness and prosperity of 1916.**

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# Continuous Care Kearns' Creed

He bought the first motor truck ever used in the brewing business in the United States.

Today he is the power behind the throne of one of the few horseless breweries in America.

He is B. T. Kearns, president of the Central Brewing Co., New York City, which operates a fleet of fifty-six gasoline and electric trucks and no horses.

Kearns bought his first motor truck and the first truck ever used for the delivery of beer in this country in 1901, 15 years ago. It was a 3-ton electric, made by the Motor Vehicle Equipment Co., Flatbush, Long Island, N. Y., later absorbed by the General Vehicle Co., Long Island City, N. Y.

The great care which Kearns saw that this truck received is evidenced by the fact that it was in continuous operation up to April, 1915, a most enviable record for any kind of truck. It was only scrapped because a vehicle of 3 tons capacity is less suitable for brewery deliveries than one of 5 tons capacity. Of course, many parts were replaced during the 14-year life of the old-timer. When it first ran over the city streets, a chloride battery furnished the motive power, but this was later changed to one of those of the modern lead-paste type. Kearns had other parts replaced from time to time as they wore out. When finally taken out of service, it had its original frame and motors, the latter being in as good shape as when the vehicle was bought. The truck was christened the Mary Ann by its driver, who cherished it as one of his best friends during all the years of its long service. It was also the pride of Kearns' heart and he always took occasion to point to it as an example of what excellent service a motor truck can give provided it is afforded the proper care and attention.

The same care which was given the famous Mary Ann by the men under Kearns' supervision is now meted out to the fleet of horseless vehicles which the Central Brewing Co. maintains at the present time. This care may be summed up in one word, thoroughness. Kearns believes in thoroughness in every detail of truck maintenance and operation as well as in other departments of his brewery work.

Thoroughness and organization go hand in hand. One without the other is almost impossible. Kearns is first of all thorough, and therefore an organizer. He has to be an organizer, because his manifold duties as the president of his company will not permit him to give more than a small amount of his time to the maintenance and operation of his truck fleet. The truck organization which carries out his orders consists of three main heads, the chief engineer, the garage superintendent and the foreman of the repair department.

Kearns gives all of his instructions to the chief engineer, who is the nominal head of the truck fleet and who is responsible for the trucks being ready for service each working day. He in turn gives his orders to the garage superintendent, who in turn delegates his authority to the mechanics of both the gasoline and electric truck departments for the actual maintenance and repair work.

All three heads are men who are specialists in the work for which they are responsible. All know the why and wherefore of truck construction, both gasoline and electric, as well as how to make repairs. For instance, the man in charge of the batteries of the electric trucks is a specialist in that particular class of work. Likewise, the foreman of the repair gang is a master mechanic who understands truck and motor design as well as the most efficient method of making repairs. All three appointments have been in life with Kearns' policy of thoroughness, for men who do not possess technical knowledge of the equipment for which they are responsible naturally can not take care of it properly.

The garage superintendent and the foreman of the repair department are not motor truck drivers promoted from the ranks. They are trained machinists. Kearns has found that the best truck driver ninety-nine times out of a hundred is a failure as a mechanic or as the head of a repair department because he does not possess the technical knowledge which is essential to the proper maintenance of a piece of machinery like a motor truck. For this reason, none of Kearns' drivers are allowed to repair or make adjustments on their trucks, except in cases of necessity. For instance, if something goes wrong with a truck while out on its route, the driver is supposed to get in touch with the chief engineer at the plant by telephone and receive his instructions before proceeding further.

This seldom happens, however, for each of the fifty-six trucks which comprise Kearns' present fleet is inspected each night as soon as it comes in from its last trip of the day. For the forty electric trucks, this work is carried on by two men at night and two in the day. Four mechanics and three helpers are employed for the gasoline trucks, three mechanics and two helpers working in the day and one mechanic and one helper at night. This force also handles the annual overhauling of both classes of vehicles.

All of the trucks are washed nightly, Kearns having found this to be a necessity both for the reason of having the vehicles spick and span each morning and because it enables the mechanics to discover loose bolts, broken castings or

(Continued on page 23)

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One of Stern Bros. Whites making deliveries as usual

On lower Broadway, where deliveries were not as usual

# Trucks Defy Eastern Blizzard

## Railroads, Trolleys and Horses Fall Victims to Storm—Buses Keep Going

PREPAREDNESS is coming to mean, more and more, an adequate supply of motor trucks for use in an emergency. At least that is one of the important parts of Father Knickerbocker's program of preparedness against traffic-impeding snowstorms which make annual drives on New York City.

Street Cleaning Commissioner John T. Fetherston, for 3 years has been building up an effective defensive organization. On December 14 last a severe storm marched out of the west and attacked complacent New York with a flying wedge of snow, sleet and rain. It was so heavy that wires everywhere sagged and came down; branches of trees were broken off and roofs caved in.

At the commissioner's call, 4,600 shovelers were called out. The subway contractors, unable to use them for their regular work, turned their trucks over to the street cleaning squads to haul snow, and seventy motor trucks were mustered for snow plow work.

These were quickly fitted with a special form of plow and set out to break the rapidly closing thoroughfares. The Fifth Avenue Coach Co. sent out a number of its buses with abbreviated graders in tow to clear Fifth avenue, Riverside Drive and the other fashionable streets it traverses, following with an ingenious sander before the slush had time to freeze.

All over the city both trucks and horses fell victims to the sodden drifts and the icy pavements, but in 3 days the main streets were opened up and traffic re-

Right, on State street on the lower end of Manhattan Island, with the Custom House to the left and Battery Park to the right. Note that wagons are only partially loaded

Above, Jeffery 2-ton four-wheel-drive demonstrator to the rescue of one of Burns Bros.' 10-ton Hewitt coal trucks which had met with mechanical trouble while making a delivery

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sumed as usual. The great tractors of the Borden, Sheffield Farms and other dairies averted what threatened to be a severe milk famine.

In Newark and other New Jersey cities where the jitney buses are worrying the traction interests, the latter have a way of saying:

"Wait until the first snow falls, then you'll see."

The populace waited and when the snow came the street cars promptly stalled all over town and were soon snowbound. The buses, however, although not as regular and unfailing as normally, and somewhat more crowded, plowed through the drifts and moved the shivering throngs. With one great railroad system totally paralyzed—the New York, New Haven & Hartford—deliveries were made by most of the department stores as usual, except for delay.

## Continuous Care

## Kearn's Creed

(Continued from page 21)

broken spring leaves, etc., before such disarrangements or breakages have become serious. Kearns says that the old adage that a stitch in time saves nine can not be better applied anywhere than in the maintenance of one motor truck or a fleet of them. Get the little things fixed while they are still little and the big things will take care of themselves. This, coupled with thoroughness, is Kearns' method of maintaining his truck fleet.

He has instilled this idea into his subordinates since he bought his first truck, the Mary Ann. He continued to instill this same idea into his workmen as he added truck after truck to his fleet while at the same time disposing of his horses. His last horse was sold in April, 1915, and his brewery graduated into the small class of those whose delivery equipment is horseless.

In this connection it is significant to note that when Kearns' equipment was mixed, that is, both horses and trucks, the latter were more expensive to operate than now when the fleet is completely motorized. This was due to a multiplicity of departments and much confusion due to the great difference in the ground-covering ability of the horse as compared with the truck and the resultant disarrangement of delivery schedules.

With the passing of the horse, this has been done away with. Now all efforts are concentrated on the motor vehicles and these are under the charge of men who understand them perfectly and do not know anything about horses.

Kearns found that he could reduce the former cost of truck maintenance by making all of the repairs in his own plant. For this reason he built a separate three-story building for a garage and shop to do nothing else but take care of the trucks. This building is light, clean and up-to-date in every respect. It is equipped with drill presses, lathes and a forge, the latter of which does the necessary blacksmithing work for the rest of the plant as well as for the trucks.

In addition, the garage force also builds bodies for the trucks. The technical knowledge of the heads of the garage departments as appointed by Kearns is evidenced by the fact that they have supervised the construction of several trucks, both gasoline and electric, which are now in actual service and giving good results. The frames of these vehicles were designed and made in Kearns' own shops and other parts, such as motors, gearsets, batteries, etc., were purchased outside and assembled as units of the home-made vehicles. This is but another example of Kearns' thoroughness, for men able to build their own trucks naturally can be expected to have sufficient technical knowledge to maintain them properly.

Although Kearns reluctantly admits to the age of 65, his looks and activeness make him appear much younger. His hair, cut in German pompadour fashion, and his moustache are grey. From his looks you would never suspect that he is an Irishman, yet he is. The fact that he is still in harness and arrives at his office at 9 a. m. every day bespeaks the hardy constitution of the Celt.

Even with the good results which he has secured from his motor truck equipment, he is always on the lookout for more information and new methods of truck maintenance which will enable him to operate his trucks more efficiently. He is one of the directors of the New York Section of the Motor Truck Club of America, Inc., and despite his years one of its most earnest workers and most learned counsellors.

New York Street Cleaning Department's special motor truck snow plows applied to 5-ton Garfords and being used to open up some of the uptown thoroughfares. Upper picture shows it in action and the lower one, its great width and method of carrying when not in action

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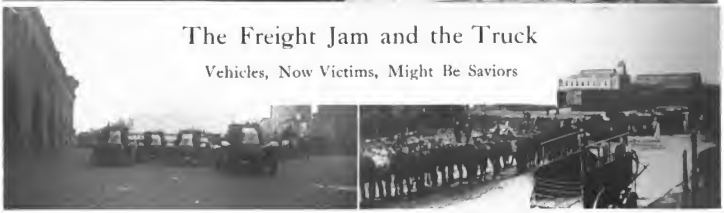
# The Freight Jam and the Truck

## Vehicles, Now Victims, Might Be Saviors



**Top picture, a typical Jersey City freight slip, showing ocean freighters taking on war truck cargoes—note loaded lighters waiting their turn—Below, left, Kelly trucks outside a New Jersey dock awaiting shipment—Right, cavalry horses being unloaded from cars**

FORTY THOUSAND cars are said to be tied up in and about the freight terminals of Greater New York, a large number of which contain motor vehicles and parts, including a goodly percentage of motor trucks.

The present freight tie-up is one of the worst the railroads have experienced. What with the storm to add to the incumbrance and delay, thousands of motor trucks, destined for the allied armies of Europe and for European merchants whose trucks have been taken from them by these same armies, lie languishing in railroad yards, some of them in cars and some roughly piled in their gigantic coffin boxes along the tracks.

Every shipment of trucks is consigned to be shipped on a certain vessel, but shippers have been forced to watch sailing after sailing slip by, ship after ship glide past Sandy Hook, while the railroads strove vainly to move their freight from the choked and tangled labyrinths of yards to the docks.

At the docks, too, all is confusion. Trucks already delivered clutter up the docks awaiting space on already overloaded vessels, heavy-laden lighters jam the slips awaiting an opportunity to tie up beneath one the ship's tireless booms.

The railroads have conferred gravely on the question and have offered as a solution the proposition that consignees must empty their cars within 15 days instead of within 30 days, as heretofore, after which demurrage charges will be made.

Vigorous protest has been made against this, however, by various business associations, which charge the railroads with attempting to force the business men to shoulder the burden of the railroads' own inefficiency, to make up for the lack of a sufficient number of cars by making each car do double duty or else earn money while standing still, to penalize shippers for the delays incurred by inadequate and inefficient transfer yards and terminals.

One great trouble with the physical conditions about the New York terminals is that nearly all transferring from the great yards in the New Jersey meadows to the city itself, to Long Island and to northern points, including Connecticut and New England, is largely dependent upon ferriage across and through the various rivers that surround the city, a long, tedious and expensive process with little flexibility and seriously hampered by the limited amount of dock room available.

Motor trucks may very conceivably be the saviors of the situation. Motor trucks could transfer the freight from central transfer terminals far out in the meadows, where plenty of space could be obtained at little cost, directly to the doors of the consignees in the metropolitan district with little confusion, with infinitely less delay than now experienced and at much less cost.

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**GLIMPSES OF THE FREIGHT BLOCKADE**

Upper left corner, Whites and Burford trucks marooned in freight yard

Above, lighters, laden with trucks, helpless in a jam of shipping in a Hudson river slip

Left, a vista down one of the congested freight yards back of the New Jersey Palisades

Below, cars waiting for ferries to take them over the Hudson from Jersey City to the Metropolis on the opposite shore

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# Truck Body Convertible Into Fifteen Forms

A Mack 2-ton truck equipped with the Melrose convertible farm body which may be made into fifteen different forms. 1—Body in normal position. 2—With extended vertical sides. 3—With conventional flareboards. 4—With shelf flareboards. 5—With high inclined flareboards. 6—With the sides folded back on top to form a top body for carrying small live stock

FIFTEEN different motor truck bodies may be made from the Melrose convertible body bed just brought out by the American Wagon Co., Dixon, Ill. It was originally designed and manufactured as an all-purpose farm wagon body but its great utility in that field and the great increase in the use of trucks by farmers generally has caused the American company to bring out three lengths of bodies particularly adapted for truck use.

The outstanding characteristic of the body is its collapsible sides made of slats tied together in much the same fashion as lazy-tongs. These may be folded together to form a fairly low-sided express type of body without flare-boards or extended vertically to form a high, slat-sided type. In their normal position, the side slats rest on top of permanent low sideboards.

Besides being extended vertically the side slats may also be formed into inclined flareboards of various widths or even made into rectangular shelf-type flareboards.

When in its normal position, as shown in No. 1 of the above illustration, the body may be used for grain of all kinds and miscellaneous goods. No. 2 shows the body with its sides extended vertically for carrying light bulky material or for horses or cows. No. 3 shows it with conventional flareboards for carrying corn on the cob and miscellaneous farm products. The body with rectangular-shelf flareboards for carrying cans of milk, boxes of fruit, or barrels of produce is shown in No. 4. This type may also be used as a party body for carrying picnicers. No. 5 shows it with wide extended flareboards for hauling hay, straw, fodder and empty barrels or boxes. The form shown in No. 6, with the sides folded over the top, is especially suitable for carrying hogs, poultry or sheep. Besides these forms, the body also may be adapted for carrying corded wood, cotton and loads of loose hay. Either one or both sides may be lowered for easy loading or unloading or for selling produce from the truck when at market.

A particular feature of the design is that all of these various body shapes may be made without the use of tools.

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# White Changes Name —Capital Doubled

## White Motor Co. Includes New York Banking Interests

CLEVELAND, O., Dec. 18—Persistent rumors that the Morgan interests had purchased a large interest in the White company of this city were set at rest today when it was officially stated that New York interests, represented by Charles D. Barney & Co., and Montgomery, Clothier & Tyler, of that city, had secured a very substantial interest in the White company. It is not known whether the financial control will pass from the present White organization, or whether the Whites retain 51 per cent of the stock of the new concern, which will be organized under the laws of Ohio as the White Motor Co., with a capitalization of $16,000,000 instead of the $8,000,000 of the old White company.

Although eastern financial interests will be represented on the board of directors of the new concern, it is understood that the present organization, with Windsor T. White, president and acting treasurer; Walter C. White, vice president and sales manager; E. W. Hulet, vice president and factory manager, and A. R. Warner, secretary, will be continued.

All of the present officials will retain their present large holdings in the new concern, but these will not bear the same relation to the complete stock issue that they have in the past. Present stock owners will hold the same amount of stock in the new organization as they had in the old, plus the amount of new stock subscription they have procured.

It is said that the deaths of Thomas H. White and his brother, Henry White, last year, tied up considerable capital which is still in the hands of trustees and that the reorganization with an increased capitalization was necessary in order to broaden the interests and work of the company.

### NEW BRISCOE DELIVERY CARS

JACKSON, MICH., Dec. 17—Final arrangements for the reorganization of the Briscoe Motor Co. and its affiliated concern, the Argo Motor Co., both of this city, were made today whereby the Swift interests of Chicago are to back the new organization. According to present plans, 5,000 light delivery cars are to be made by the new concern during 1916 in addition to a larger number of passenger cars.

The large plants of the Lewis Spring & Axle Co. have been purchased by the new organization and will be used for the manufacture of the new Briscoe line.

### ABBOTT-DOWNING TO MAKE TRUCKS

CONCORD, N. H., Dec. 27—Plans are under way at the famous Abbott-Downing plant here to manufacture motor trucks. This company has been in the wagon building business for more than half a century and its products are known the country over. With the development of the motor vehicle industry there has been less call for high-grade coaches, and so the business has dwindled. A conference was held recently to go over the situation of whether it was advisable to close down the plant or try to manufacture motor vehicles.

President Samuel C. Eastman of the New Hampshire Savings Bank, who has some money invested in the company, was a deciding factor in continuing the business by building motor trucks of 3 tons and upwards. So additional capital is being secured to finance this work and specifications for machines have been made and bids asked for supplying them. There is a fine plant in which to do the building and Concord is a big railroad center, so the shipping facilities are first class. It is felt by the men interested in the new venture that it will be better to confine activities to New England at first. Old customers of the company have been asked their opinion about it and a number of them have replied that the proposition seemed feasible.

### LENOX PLANS BIG OUTPUT

HYDE PARK, MASS., Dec. 18—Officials of the Lenox Motor Car Co., which recently reorganized with a capitalization of $1,000,000, who are in New York conducting negotiations with a big firm that has a contract with the Allies for trucks, have sent word here that the company will build 500 to 1,000 3-ton trucks as their order. The company took over factories at Fall River and Lawrence recently and the trucks will be built there and also at the Hyde Park factory.

### AN AMPHIBIOUS TRUCK

LOS ANGELES, CAL., Dec. 18—The Hydromotor, which has been receiving so much attention in San Francisco in demonstrations on both land and water, is to be manufactured in this city by a company headed by G. Lopizich, president of the International Bank of Los Angeles. A factory will probably be located either at Wilmington or Lankershim, suburbs of Los Angeles.

The vehicle will be made in both passenger and commercial models. The vehicle is 16½ feet long and is propelled in the water by a 16-inch screw. It has 42-inch wire wheels, the land propulsion being through the rear wheels, as usual.

### FROME, A NEW TRUCK

MILWAUKEE, WIS., Dec. 21—The R. L. Frome Mfg. Co., Howard's Grove, Sheboygan, Wis., a large producer of boxes, is making extensive additions to its plant in preparation for the manufacture of a light delivery truck with worm drive. It has been experimenting for more than a year.

### NEW UNITED 1½-TONNER

GRAND RAPIDS, MICH., Dec. 16—A new 1½-ton worm-driven truck, made by the United Motor Truck Co., of this city, will be ready for delivery about February 1. The specifications of the new model are published elsewhere in this issue, together with those of the other United vehicles offered on the 1916 market.

### NEW ¾-TON ACME

DETROIT, Dec. 23—A new ¾-ton model is to be brought out by the Cadillac Auto Truck Co., Cadillac, Mich. No details of the new model are available as yet, but will be published in THE COMMERCIAL VEHICLE as soon as they may be obtained. The Cadillac company was formed several months ago to manufacture a 2-ton worm-driven truck.

# Fuel Investigation by Federal Body

## Trade Commission Will Probe Rise in Gasoline Price

WASHINGTON, D. C., Dec. 28—The Federal Trade Commission is preparing to investigate the high prices of gasoline. It has been charged that where there is competition, prices are low, whereas where no competition exists, prices are high. It is also alleged that the prices of crude as given as an excuse for increased gasoline prices have not gone up enough to warrant such increases in the finished product. It is stated that there is no shortage of crude.

The commission will investigate all of these charges. The Geological Survey keeps accurate oil production statistics and can readily settle the latter matter. The commission has full power to push its investigations as far as it likes and can also punish offenders against the law and adopt remedial measures. It is thought that a congressional investigation will shortly be inaugurated.

### FEDERAL INCREASES WAGES

DETROIT, MICH., Dec. 24—A bonus of from 5 to 10 per cent of their yearly salary was the Christmas present which the Federal Motor Truck Co. gave to its employes this year. The 10 per cent bonus went to those who had been on the company's payroll one year or longer; a bonus of 7½ per cent went to those who have been with the company from 9 months to 1 year, and the 5 per cent bonus to those with the company from 6 to 9 months.

According to Vice President M. L. Pulcher, this policy is giving excellent results, as it tends to reduce very materially the number of employes leaving the company during the year. During 1915, the number of employes who have been on the payroll for 1 year or more was increased 15 per cent over the previous year.

### STANDARD TRACTOR IN NEW HOME

NEW YORK CITY, Dec. 29—The Standard Tractor Co., formerly located at 68 Flushing avenue, Brooklyn, N. Y., has moved into enlarged quarters at 120 to 128 Waverley avenue, where it has secured a one-story factory 100 by 100 feet with approximately 10,000 square feet of floor space.

The building is of brick and will contain a power plant. New machinery to a value of between $4,000 and $5,000 is being installed and twenty-five men are to be employed. The new machines will all be direct driven by individual motors. The offices will be located in the factory building.

### DANN INSERTS COST LESS

CHICAGO, Dec. 16—Dann cushion spring inserts have been reduced in price, sets formerly selling for $8 now being priced at $5.75 each.

### HARPER, LATEST TRAILER

SOUTH BEND, IND., Dec. 20—The Harper Buggy Co., Columbia City, Ind., is manufacturing a trailer of 1,500 pounds capacity, arranged to be attached to a motor vehicle by means of a universal joint connection.

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# Schemes for Gotham Snow Removal

## Suggest Po ice Truck Subsidy and Contracts

NEW YORK CITY, Dec. 18—Two feasible methods for eliminating traffic congestion in New York City during snow storms by carting the snow away quickly were advanced at a meeting of several of New York City's civic organizations, held today at the office of Police Commissioner Woods in the Municipal building. One of the ideas suggested the subsidizing of a sufficient number of motor trucks by the city government to cart the snow away quickly. The trucks selected were to be listed and classified according to the districts in which their owners' places of business are located. A complete list was to be kept at the police commissioner's office and other smaller lists at each precinct headquarters of the number of subsidized trucks in that precinct. As soon as the snow began to fall, the captain in charge of each precinct was to call out all the subsidized trucks in his district and there were to be put to work carting snow in that precinct. The trucks were to be at the call of the police day and night.

The other suggestion proposed giving one or two firms in each block or area bounded by several streets, the contract to haul the snow in that area at a certain stipulated sum per yard. The holders of such contracts were to agree to start their work as soon as the snow began to fall and before it got such headway as to impede traffic. The men to shovel the snow into the trucks were to be recruited from the ranks of the concerns holding the snow removal contracts.

Both proposals seem reasonable, but whether they will be carried out depends upon whether the necessary laws can be passed.

Theodore D. Pratt, president of the Motor Truck Club of America, Inc., represented the club at the meeting and took an active part in the discussion. The police commissioner is to call other meetings of the same civic organizations in the near future to act on these suggestions or to submit others.

### MILWAUKEE BUYS SWEEPER

MILWAUKEE, WIS., Dec. 21—As the result of exhaustive tests of a motor-driven squeegee type, street-cleaning machine, made by the department of public works, the city of Milwaukee will purchase a battery of such machines early next year. The machines are built by the Kindling Machinery Co., of Milwaukee, which has furnished similar horse-drawn equipment for many years. The cost of cleaning streets with the motor-driven type is 16½ cents per 1,000 square yards of pavement, compared with 38.8 cents by horse-drawn equipment.

### BAY STATE FOR PREPAREDNESS

BOSTON, MASS., Dec. 20—If plans arranged by William G. Renwick, counsel for the Massachusetts State A. A., are carried out, owners of motor trucks and dealers in such vehicles will form a valuable unit in the plans for preparedness which is sweeping through the Bay State. Mr. Renwick is attached to the militia and recently he presented the state with a machine gun, and he has been authorized to form a machine gun squadron. Now he has gone a step further and he has prepared a bill to be submitted to the legislature to allow the forming of a motor corps. The first unit will comprise owners of cars, and the next step will be the enlistment of the motor truck owners.

He plans to have some statistics gathered as to the number of available vehicles in the state, and their owners and location tabulated. Then as stated periods he would have the militia officers have some drills to take the part of quick mobilization. Each owner would be attached to some particular squad and at the orders would rush his vehicle to the place appointed to carry out the orders. The passenger cars would be used for quick assembling and the trucks for carrying men, baggage, ammunition, stores, and such other things as are necessary for an encampment.

A bill covering this matter is to be submitted to the legislature next month, and as it will have the backing of the military officials it is expected to pass. The owners will be paid for time used in drill, which will not be along the lines of the regular maneuvers, which last a week each year, but perhaps once or twice a month.

### William C. Andrews

NEW YORK CITY, Dec. 21—William Claflin Andrews, advertising manager of the Edison Storage Battery Co., East Orange, N. J., 60 years old, died from an overdose of strychnine at the Chelsea hotel here today.

He is survived by his wife and two children, of 135 Burnett street, East Orange, N. J. He was a man of wide experience in the electrical field and was well and favorably known by a wide circle of friends. He was active not only in the electric vehicle field, but also in motor car and motor truck circles.

He had been suffering from a nervous disorder for some time and was taking the drug under a doctor's prescription when the overdose which caused his demise was taken.

### Coming Commercial Vehicle Events

Jan. 5-6.....New York City, S. A. E. Winter Sessions, Standards Committee Meetings.

Jan. 8-15.....Cleveland, O., Show, Wigmore Coliseum.

Jan. 8-15.....Philadelphia, Pa., Show.

Jan. 18.....Newark, N. J., Monthly Meeting, Motor Truck Club of New Jersey, Automobile Club, 22 Washington place.

Jan. 19.....New York City, Monthly Meeting, Motor Truck Club of America, Automobile Club of America.

Jan. 29-Feb. 5...Columbus, O., Motor Vehicle Show.

Jan. 29-Feb. 5...Minneapolis, Minn., Motor Vehicle Show.

March 4-11.....Boston, Mass., Motor Vehicle Show, Mechanics' Hall.

# Jan. to Oct. Exports 18,865 Trucks

## 1,596 Worth $4,307,190 Shipped During October

WASHINGTON, D. C., Dec. 18—During October, 1915, 1,596 motor trucks, valued at $4,307,190, were exported to all foreign countries. During October, 1914, the exports amounted to 672 trucks valued at $2,286,964.

The exports during the 9 months ending October, 1915, amounted to 18,865 trucks, valued at $52,076,406. During the same period of 1914, 1,309 trucks, valued at $3,353,509, were exported. The 9-month period of 1915 thus shows a gain of 17,556 trucks and a gain in valuation of $48,722,897 over the same period of 1914. The average price of the motor trucks shipped during the 9-month period of 1915 was $2,761.

### WAR ORDERS FROM MEXICO

LOS ANGELES, CAL., Dec. 18—The Moreland Distillate Motor Truck Co., of this city, has discovered a new field for the commercial car. Four Moreland trucks have just been delivered to the recently recognized Mexican government.

As a special agent for the Caranza forces, operating under orders from General Alvaro Obregon, Senor A. Gonzales, one of the wealthiest and most influential citizens of Mexico, came to Los Angeles to purchase four trucks for military service. Dealing direct with the factory officials, the Senor had the four trucks, equipped with bodies, on the way to Mexico by express, accompanied by an expert driver and mechanical expert, in less than 24 hours.

In less than 48 hours after the order was given, the trucks were being unloaded at Nagoles, The formalities of the customs service had been previously arranged and the trucks crossed the line and went into service without a hitch.

According to officials of the local factory, the first order is but a fraction of the business awaiting the truck manufacturer in Mexico under the newly established and recognized government, which is expected to restore peace within a short period.

### CUBA MARKET ATTRACTIVE

WASHINGTON, D. C., Dec. 16—Corroboration of Martin L. Pulcher's sanguine reports of the promise of the Queen of the Antilles as a motor truck market which he made after his return from a brief sojourn there is contained in a report by Special Agent Garrard Harris of the Department of Commerce.

The island has just realized on a $200,000,000 sugar crop and the mills are working on another which promises even greater returns. Optimism prevails. However, the cost of keeping horses is very high, since practically all grain and hay is imported. Motor buses, too, offer great possibilities, for the streets of Havana are good and there are rural highways throughout the island.

The only way to successfully sell trucks in Cuba is to have competent Spanish-speaking salesmen on the ground, armed with literature printed in Spanish.

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# I.C.C. Kills New Erie Ferry Charges

## Maintains It Has Jurisdiction Calls Rates Unreasonable

WASHINGTON, D. C., Dec. 22—Holding, against the contention of the Erie railroad, that it has full jurisdiction over interstate ferries as well as interstate railroads, the Interstate Commerce Commission today handed down a decision rejecting the proposed increase in the rate for motor trucks and horse wagons between New York City and Jersey City. It declared that the rates proposed were unreasonable and instructed the railroad to cancel them.

Protests were made by the city of Jersey City and by the Chamber of Commerce of that city and also by the Hudson County Team Owners' Assn., the New York Team Owners' Assn. and the Motor Truck Club of America. The proposed rates would have taxed motor trucks more heavily than horse vehicles, and the rates would have been on a basis of weight.

### GERMANS MAKE SYNTHETIC TIRES

BERLIN, GERMANY, Dec. 13—Chancellor von Bethmann-Holweg, in a speech before the Reichstag last week, stated that a method had been devised by German chemists by which rubber could be compounded chemically at a practicable commercial cost. Since then, rubber tires have been made which it is stated are so superior to natural rubber in wearing qualities that they will last a year. A factory has been started to manufacture this synthetic product.

### PRATT RE-ELECTED TRUCK CLUB PRESIDENT

NEW YORK CITY, Dec. 16—At the Sixth Annual Meeting of the Motor Truck Club of America, held at the Automobile Club of America here last night, Theodore D. Pratt, works engineer of the Central Stamping Co. and an operator of motor trucks, was elected unanimously to a second term as president.

Ellis L. Howland, who served the club as secretary during the administrations of George H. Duck and D. C. Fenner in 1914 and 1913, and who is motor truck editor of the *Journal of Commerce*, was made secretary. Nathaniel Mallouf, of the Harrolds Motor Car Co., New York dealer in Pierce-Arrow vehicles, was made treasurer.

Roderick Stephens, of the Ollin J. Stephens Coal Co., was made first vice-president; D. C. Fenner, of the General Vehicle Co., second vice-president; and Haywood P. Cavarley, of the National Lead Co., third vice-president. Directors were: George H. Pride, Joseph K. Orr, Emanuel Lescaris, Elmer B. Clark and A. J. Slade.

President-elect Pratt, in his annual report, spoke highly of the work which the club has accomplished in relation to the Meyers ordinance, the Erie ferry rate case and in raising the dues to $25 per year with an exclusive owner qualification for membership, during the past year. He also spoke of the new membership secretary, L. W. Statler, in praise of his campaign, now under way.

Secretary Carle went more into detail concerning the club's activities in his report, and Mr. Statler, in a short address, sketched the methods and results expected in his campaign.

The subject of the proposed war tax on gasoline was brought up and the concensus of opinion among those who spoke on the subject was that it was ill-advised and unfair.

### NEW GARFORD 3½-TONNER

LIMA, O., Dec. 28—The Garford Motor Truck Co., Lima, O., has just announced a new 3½-ton model of Garford truck. The new vehicle resembles the chain-driven types, having its motor between the seats and the characteristic Roman front dash, but differs from previous sizes in that it has worm drive. It is priced at $3,400.

### TRUCK CLUB ASKS FOR GRANITE BLOCK PAVING

NEW YORK CITY, Dec. 16—President T. D. Pratt, with the sanction of the Motor Truck Club of America, on December 11, pursuant to a resolution adopted by the club at its November meeting, dispatched a letter to Marcus M. Marks, president of the Borough of Manhattan, City of New York, making a strong plea for granite block as a material to be used in the paving of lower Broadway after the subway excavation is completed.

It became known some time ago that the city was considering the laying of asphalt paving along lower Broadway. Mr. Pratt in his letter pointed out that both horse and motor truck interests were agreed that asphalt is the wrong pavement, because it was not durable, it would very soon become rough and rutted, and the draft in hot weather was much greater than on harder surfaces.

It was also pointed out that this portion of the famous way is given over almost entirely to commercial haulage.

### PIKE'S PEAK CLIMB SLATED

NEW YORK CITY, Dec. 20—Scheduled for September next, a hill climb will be held on the new Pike's Peak highway, Col. Special classes will be included for motor trucks, which will make the climb with and without loads. Passenger cars will also compete. A free-for-all event will be held, the prize for which will be a model of the mountain and the new road done in real Cripple Creek gold.

### CURTIS ADDRESSES E. V. A.

NEW YORK CITY, Dec. 29—At the December meeting of the Electric Vehicle Assn. of America, New York Section, held at the Consolidated Gas Co.'s building, Fifteenth street and Irving place, here, last night, E. W. Curtis, Jr., manager of the London office of the General Vehicle Co., Long Island City, L. I., gave an extemporaneous talk on electric vehicle conditions in Europe, in which he pointed out the progress being made in the sale and application of electric trucks in Europe, particularly in England.

S. C. Harris, of the New York Edison Co., presented a paper entitled "Methods of Design and Operation Which Assure Efficiency of the Electric Vehicle."

# Daniels and Wood to Address S. A. E.

## Reeves Will Also Speak on Needs of Preparedness

NEW YORK CITY, Dec. 28—As a climax to its winter meeting, the Society of Automobile Engineers will make the practical requirements for national preparedness the leading thought at the annual banquet at the Hotel Plaza, Thursday evening, January 6, which will mark the conclusion of its New York mid-winter session. The Honorable Josephus Daniels, secretary of the navy, who originated the Naval Consulting Board, in which the S. A. E. is actively represented by two of its past-presidents, will address the members, while Major-General Leonard Wood, U. S. A., will discuss the army transport problems. Alfred Reeves, general manager of the National Automobile Chamber of Commerce, will speak for the manufacturing end of the industry.

### S. A. E. LEARNS REQUIREMENTS OF ARMY TRANSPORT

NEW YORK CITY, Dec. 17—The requirements of the army transport service were outlined by Capt. Gordon Johnson of the Eleventh U. S. Cavalry, at the regular monthly meeting of the Society of Automobile Engineers, held tonight at the Automobile Club of America. Capt. Johnson stated that it was not his idea to outline the specifications of an ideal motor truck for army transport work, but rather to state the problems which an army transport system has to deal in maintaining supplies and other necessary duties.

He pointed out that the division of 15,000 men is the tactical part of an army which must be considered in arranging for its transportation, including food, ammunition and baggage. It was also stated that such a division could only march 12½ miles per day, and that for rapid transportation in case of an attack by the enemy some type of motor vehicle should be used to get the troops to a good defensive position and to save the supplies from capture.

### HARPER ELECTED PRESIDENT OF JERSEY TRUCK CLUB

NEWARK, N. J., Dec. 21—David Harper, of the David Harper Co., a building supply concern in Newark, was re-elected president of the Motor Truck Club of New Jersey for another year at the annual meeting, held tonight at the Automobile Club of New Jersey, 22 Washington place. The other officers elected at the same time were: J. L. Black, in charge of the truck equipment of C. Feigenspan, Inc., vice president; George Jancovius, treasurer, and Nelson S. Pringle, of the Autocar Sales & Service Co., Newark, secretary. George Woodward, the retiring secretary, was elected a director, together with J. T. Castle and L. C. Ward.

Besides the annual election, Theodore D. Pratt, of the Central Stamping Co., Newark, and president of the Motor Truck Club of America, Inc., New York City, gave a very interesting talk on the aims and purposes of a motor truck club. He outlined the objects of a motor truck club as follows: To increase the efficiency of the operation and maintenance of motor trucks; to prevent

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illegal legislation against motor trucks; to provide a common meeting ground where the owners of trucks may interchange their ideas on truck operation and maintenance, and to collect and record cost data based on some uniform system so that the operation of one truck may be compared to any other in the same line of work.

### WILLIAMS TALKS ROADS TO QUAKERS

PHILADELPHIA, PA., Dec. 16—S. M. Williams, sales manager of the Garford Motor Truck Co., Lima, O., was the speaker of the evening at the December meeting of the Motor Truck Assn. of Philadelphia, held here last night. He chose the subject upon which he has been engaged for so long, and on which he is an able authority—good roads.

"Good roads are an economic necessity essential to all phases of our commercial and social intercourse and development," stated Mr. Williams, whose talk continued with an illuminating address on the importance of good roads to the farmer, since transportation is such a large item in agriculture; the effect of road repair upon the cost of living, pointing out that as most of the transportation which is necessary in the production and distribution of food and other commodities is over the roads, as much of the cost of the products is transportation cost of one kind or another, and as good roads surely reduce the transportation cost, the city dweller was equally concerned in the matter; and concluding with an able plea for more and more vigorous co-operation in the good roads movement by the motor truck industry.

Mr. Williams stated that a federal highway bill is about to be introduced in Congress, providing for federal aid to the states in road building, apportioned according to area, population and road mileage.

PHILADELPHIA, PA., Dec. 16—At the annual meeting and dinner of the Motor Truck Assn. of Philadelphia, held recently at the Hotel Adelphia, the following officers were elected: President, Emlen S. Hare; vice president, Lee J. Eastman; treasurer, John D. Howley; secretary, W. H. Metcalf. On the board of directors will be D. H. Zimmerman, O. W. Doolittle, E. M. Bartlett, P. S. Russell and H. M. Cole. During the evening addresses were made by S. M. Williams, sales manager of the Garford company; J. E. Eustis, of the New York Evening Mail, and President Hare. The latter, on behalf of the association, presented gifts to E. B. Jackson, retiring president, and W. H. Metcalf.

### TRUCKS AS TERMINAL FEEDERS

WASHINGTON, D. C., Dec. 17—At the recent convention of the Rivers and Harbors Congress, held at the Hotel Willard here, H. L. Whittemore, of the Autocar Co., Ardmore, Pa., presented an address dealing with the work of the motor truck in connection with railway and steamship transportation, particularly in the work of getting farm produce to steamship docks.

Secretary Thompson of the congress invited Mr. Whittemore to present the paper after having read an article in *Marine Review* on the same subject.

Mr. Whittemore recited the experiences of the Fruit Belt Auto Truck Express, South Haven, Mich., and the Bush steamship line of Wilmington, Del., as practical examples of the good results of co-operation between carriers and trucking concerns using motor trucks.

# Chicago Fender Law Is Invalid

## May Develop Standard Type and Try Once More

CHICAGO, Dec. 21—The Chicago ordinance requiring the use of fenders on motor trucks has been declared invalid by the corporation counsel. The Chicago City Council has been urging the enforcement of the fender ordinance for several months, but it met with such opposition by the Illinois Manufacturers' Assn. and other organizations claiming that the law was unconstitutional, that it put the legality of the ordinance up to the corporation counsel.

In the law department of the city it was found that no type or types of fenders could be definitely prescribed for use, and the only course left was to provide by ordinance for a standard type determined by uniform tests. The committee in charge of the matter will take up the preparation of a new ordinance, it is understood.

### TRUCK MEN IN HERCULES

CANTON, O., Dec. 16—Operations at the plant of the recently-organized Hercules Motor Mfg. Co. of this city are to start in February. A meeting was recently held at which directors were elected as follows: H. H. Timken, of the Timken Roller Bearing Co.; J. G. Obermier and O. J. Strayer, of Canton; G. M. Mather, of the Mather Spring Co., Cleveland, O.; M. L. Pulcher, of the Federal Motor Truck Co., Detroit, and Charles Balough, formerly chief engineer of the Kelly-Springfield Motor Truck Co., Springfield, O.

Charles Balough was elected president, Gordon Mather, vice president, and O. J. Strayer, secretary and treasurer.

The plant will be located near the Aultman group. The first building will be 65 by 400 feet, of reinforced concrete, two floors high, and will cost $75,000. New machinery being purchased will cost $75,000.

### KENTUCKY WAGON MFG. CO. HOLDS CONCLAVE

LOUISVILLE, KY., Dec. 30—The Kentucky Wagon Mfg. Co., of this city, manufacturer of Old Hickory gasoline and electric motor trucks and Urban electrucks, held a get-together convention for its officers, agents and salesmen in this city from Monday, December 27, 1915, to January 1. Headquarters were established at the Watterson hotel. Addresses were made each morning and afternoon in the hotel auditorium. These dwelt upon the manufacture, distribution and sale of the company's motor vehicles and other products, with the idea of making the Old Hickory organization more efficient than ever before.

### NEW CAST STEEL WHEEL

SYRACUSE, N. Y., Dec. 24—The Smith Wheel, Inc., of this city is shortly to produce a new form of cast steel wheel especially for motor trucks. It is of the hollow one-piece type, with twelve spokes, like a wooden wheel, thus avoiding the odd appearance common to some steel wheels. The spokes are a graceful smooth-exterior oval, blending naturally with the felloe and hub.

It is fitted with reinforcements in its cored-out interior and has no holes except the regular hub flange holes, which are standard, thus permitting the wheel to be interchangeable with standard wood wheels.

The wheel is made both for single and dual tires and is adapted to either pressed-on or demountable solid tires.

In tests it is claimed that the wheel was able to take a load of 30 tons in a horizontal direction before the wheel dished ¼ inch, when with the pressure withdrawn it sprung back into its normal shape. Individual spoke sections were also stressed up to 30 tons, it is stated, the wheel load being taken by six spokes, three upper and three lower in practice.

The alloy of which the wheels are made is said to have been in use for over 30 years and to be especially immune to crystallization.

### TRUCKS FOR INDIANAPOLIS RURAL MAIL

INDIANAPOLIS, IND., Dec. 21—Fifteen motor vehicles will be put in service on January 1 for the delivery of rural mail from the Indianapolis post office. A saving of $13,000 yearly will be effected by the change from horses to motors, according to the estimate of Postmaster Robert Springsteen.

The roads out of Indianapolis have been improved to such an extent during the past year that it is estimated that the fifteen motor vehicles will replace thirty-five horse wagons and will cover 900 miles daily as compared to 850 covered by the horse vehicles during the past year.

### 30,000 MILES WITHOUT WEAR

DETROIT, MICH., Dec. 16—The Internal Gear Drive Assn., of this city, is authority for the results of a test of an internal-gear-driven axle made by one of the large Detroit truck builders now making trucks with another form of drive.

These tests were made by the experimental department of the concern to test the truth of statements to the effect that internal-gear-driven axles were not durable. The axle was run 30,000 miles.

The test began 2 years ago, when the manufacturer installed an internal-gear-driven axle in one of his trucks. For 3 months this truck was run night and day. One of the favorite means of testing the truck and primarily the axle was to run it at an angle up a steep railroad embankment, across the tracks at the top, and then down the other side. After 3 months the truck was put in factory service and for about 21 months has averaged over 50 miles a day.

The axle was then taken down for inspection and it was found that practically the only wear was about 1/64 inch on the teeth at the pitch line of the large internal gear. This wear did not act against the noiselessness of the axle in any way nor affect its efficiency. This result was considered all the more remarkable as the gear had not been lubricated in the 2 years it had been in use.

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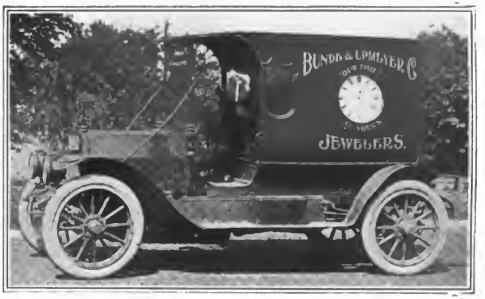
## Making the Body Earn

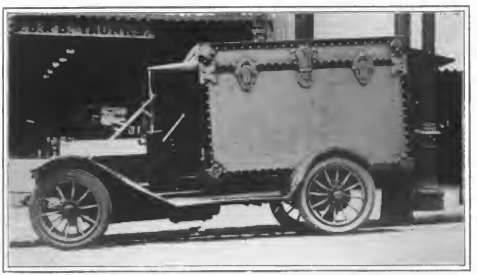
MANY firms fail to take full, or often any, advantage of the advertising possibilities of their delivery cars, while others go to the opposite extreme with freak bodies or glaring color combinations. Good advertising and good taste go hand in hand, however, in the body shown to the right. The clocks on each side not only have the value of attracting attention wherever the car goes, but of reminding the public that the firm is in the clock and jewelry business. Since the clocks keep excellent time the public is not tricked but actually repaid for the attention given. This is good advertising psychology and should be kept in mind more often in planning such matters.

In keeping with the dignity of this Milwaukee firm the body is finished in black and the lettering is in gold. Seth Thomas clocks with 12-inch faces are used. These clocks are mounted on coil springs and enclosed in back by wooden boxes. Heavy plate glass, of course, protects the faces.




Two examples of bodies which earn their keep by advertising their owners' business

Although the driver is moderately careful, the car, which is a Mitchell, gets its share of hard jolts, and it is of interest that the clocks have given practically no trouble in the several thousand miles which the vehicle has covered.



BOYD, BOYD & BOYD, trunk manufacturers, of Pittsburgh, Pa., are believers in quick delivery and advertising. To deliver trunks in their territory, a special body has been designed and applied to a light delivery chassis. This body is in the form of a huge trunk, every detail of the familiar packing box being faithfully duplicated in giant scale. It holds twelve ordinary-sized trunks or a whole galaxy of smaller suit cases and bags. The truck furnishes the swift locomotion demanded for quick delivery while the unique body advertises the business of the concern in a most effective manner. As trunks are bulky, but light, the great capacity of the body does not entail any overload.

## Truck Speeds War Deliveries

Among the Hartford factories that are being kept busy because of the war in Europe is the Pratt & Whitney Co., a subsidiary of the Niles-Bement Pond organization. Although the works of this company are situated beside the main line tracks of the New York, New Haven & Hartford railroad, much of the machinery shipped has to be conveyed to some of the city freight terminals before it can be loaded on the cars. To meet this condition the Pratt & Whitney company recently installed a 5-ton Pierce-Arrow, which is shown in the accompanying illustration. As shown, the truck is loaded with two cases of machinery destined for parties in England. It will be noted that there is no legible destination marked on the cases. The truck is kept busy in this sort of service and is doing very efficient work. The running gear is painted dark green with broad, white striping. An experienced driver operates the car. The Pratt & Whitney company recently acquired the Capitol avenue plant of the Pope Mfg. Co.

While American trucks abroad are on the battlefields, those at home help to shipping machinery and supplies to the waiting belligerents

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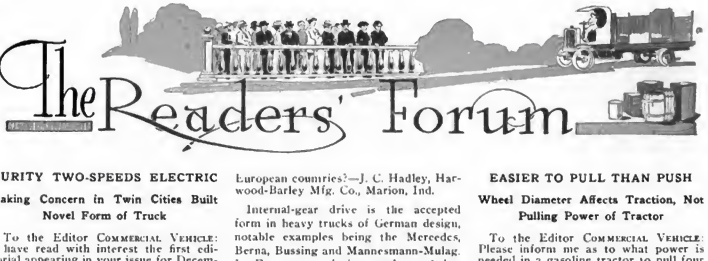


## PURITY TWO-SPEEDS ELECTRIC

### Baking Concern in Twin Cities Built Novel Form of Truck

To the Editor COMMERCIAL VEHICLE: I have read with interest the first editorial appearing in your issue for December 15, 1915, on the two-speed electric, and note that one firm is already using such a device.

I should greatly appreciate further information on this subject with the name of the firm using the vehicles, etc.—Willis M. Thayer, manager, vehicle sales, Hartford Electric Light Co., Hartford, Conn.

The concern in question is the Purity Baking Co., St. Paul, Minn., which owns a fleet of forty light electric trucks which it built in its own shops. These are all equipped with two-speed gearboxes.

## SECRETARIES OF TRUCK BODIES

### E. V. A. and N. A. C. C. Principal Associations Pushing Sales of Trucks

To the Editor COMMERCIAL VEHICLE: I have understood that the manufacturers of electric trucks for handling freight have an association for pushing the sale of their trucks. If such an association exists, will you be kind enough to let me know who is secretary and what his address is?

Possibly the manufacturers of gasoline trucks also have an organization of this kind. If such an organization exists please let me have the name and address of the secretary.—H. L. A., New York City.

The Electric Vehicle Assn. of America is the national organization for the purpose of promoting the wider and more efficient use of electric vehicles of all kinds. The executive secretary is A. Jackson Marshall, 29 west Thirty-ninth street, New York City.

The National Automobile Chamber of Commerce is the national organization for the purpose of promoting the wider and more efficient use of gasoline and also electric vehicles of all kinds. The secretary is Harry W. Perry, 17 west Forty-second street, New York City.

## FOREIGN FINAL DRIVE STATUS

### Internal-gear Peculiar to Continental Truck Practice

To the Editor COMMERCIAL VEHICLE: Can you give me any data as to the percentage of internal-gear-driven trucks to worm-driven trucks in the different European countries?—J. C. Hadley, Harwood-Barley Mfg. Co., Marion, Ind.

Internal-gear drive is the accepted form in heavy trucks of German design, notable examples being the Mercedes, Berna, Bussing and Mannesmann-Mulag. In France, too, it is prominent, being used on DeDions, Schneiders, Latils and Berliets. Swiss makers use internal-gear drive to some extent, but no trucks of English origin have internal-gear drive.

Worm drive is used extensively in England, to a considerable extent in France and also in Switzerland. A popular form of drive both in England and Germany is the double-reduction.

Up until recently of the three leading truck-producing countries abroad, only France admitted worm-driven trucks to the military subsidy.

Inquiries are now being made abroad by THE COMMERCIAL VEHICLE to determine the exact status of different forms of final drive in Europe at the present time.

## HORSES AND TRUCKS IN U. S.

### No Census of Horse-drawn Vehicles—Truck Figures Estimated

To the Editor, COMMERCIAL VEHICLE: What do you figure is the total number of horse-drawn vehicles, both pleasure and commercial, in use today, and what is the total number of motor trucks and passenger cars in use?

Please let us know, also, if you can, what your estimate is on the total number of motor trucks in use and the total number of horse-drawn commercial vehicles in use.—H. P. S., Detroit.

No world census of motor vehicles or horse-drawn vehicles is available. In the United States there are roughly 2,000,000 motor vehicles of all types and 25,000,000 horses and mules of all ages, breeds and conditions. Of these about 19,000 are used on farms. There are also no figures to show how many vehicles there are in proportion to the number of horses. From the above, however, it will be seen that some 6,000,000 horses are used in other than farm work, including military, commercial and pleasure use. There are approximately 120,000 commercial motor vehicles in use in this country, not including converted passenger vehicles.

## EASIER TO PULL THAN PUSH

### Wheel Diameter Affects Traction, Not Pulling Power of Tractor

To the Editor COMMERCIAL VEHICLE: Please inform me as to what power is needed in a gasoline tractor to pull four 16-inch plows.

2—Can a tractor wheel of 30 to 32 inches diameter have as much traction or pulling power as a larger wheel, assuming that the vehicle is run at the same speed and with the same power applied?

3—Has a tractor got as much pushing as pulling power or would the maximum load vary according to whether it was pulled or pushed?

4—Could an electric generator powerful enough to start a 40 to 45 horsepower engine run an electric motor requiring about 3 horsepower? What would be the wholesale price of such an apparatus?

5—Is there any way to transmit power between two points, the distance between which is constantly changing, except by the use of a flexible cable? Would it be possible to construct a cable strong enough to transmit from 3 to 5 horsepower over a distance of 4 feet and, if possible, would it be practical?

6—Kindly publish a formula whereby I can calculate the pulling power at the drawbar of a tractor when the weight, horsepower of the motor and distance between the motor and the center of the driving wheels are given.—N. L. W., Red Wing, Minn.

1—Not sufficient data is given in this case. It would be possible to draw four, or even forty such plows with a 1-horsepower engine if a sufficiently slow speed were tolerated. Power consists of three factors, pressure, distance and speed. It would require a great deal more power to draw such plows at a speed of 4 miles an hour than would be to draw them at 2 miles an hour.

2—Diameter has nothing to do with the pulling power of a wheel. Assuming the conditions you have, namely, that the same power is applied and that the vehicle proceeds at a given speed, the same pulling power would be transmitted by a wheel 4 inches in diameter as one 72 inches in diameter because a different gear-reduction would be required for each different wheel diameter, which would make the final result in feet of vehicle movement per revolution of the engine shaft identical. The difference in performance of wheels of different diameters is due to the difference in road re-

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sistance and traction which have nothing to do with the transmission of power. A large wheel will always give better traction than a small wheel because the surface contacts with the road on a wider arc thereby bringing a greater amount of surface into contact with the road.

While increase in contact area does not increase the friction co-efficient, in cases where slippage might result from a slippery place the larger area will be more likely to keep dry. Furthermore, traction is not entirely a matter of friction co-efficient versus pressure, for there is always a certain amount of mechanical adhesion of a wheel to the road. Further, a large wheel, having a larger contact area, will not sink so deeply into the soil. A wheel in use is continuously climbing a hill and the grade of this hill depends upon the diameter of the wheel. The smaller the wheel the greater this little grade and therefore the more difficult it is to climb. A large wheel will mount obstructions that a little wheel could not surmount and it will roll over depressions into which a small wheel will drop and often mire. A small wheel is often very convenient to use, and the same power may be transmitted with it, but for practical purposes, the larger the wheel to be used on bad roads or in fields, the better, of course within reasonable bounds.

3—On a perfectly level road any motor vehicle has as much pushing power as pulling power but as there are no such roads in existence, this equality does not hold and the pulling power exceeds the pushing power. The path of a farm tractor over rough and uneven fields is one continual process of lifting the vehicle wheels over small obstructions, and as it takes more power to push a wheel over an obstruction than it does to pull it over, the vehicle can pull more than it can push. The reason why it takes more power to push a wheel over an obstruction than it does to pull it over, may be best understood by analyzing the forces which come into play:

The force transmitted to the driving axle of the vehicle may be shown graphically by a horizontal line parallel with the ground. As soon as the front wheels strike an obstruction a portion of this force is resolved along a line from the point of application on the driving axle to the point where the front wheel touches the obstruction. The remainder, resolved at right angles to the latter force, tends to raise the wheel up and over the obstruction. This lifting force acts on an imaginary bellcrank lever, the fulcrum of which is at the point where the wheel strikes the obstruction and whose arms extend from the fulcrum to the center of the wheel hub and to the point of contact of the wheel on the ground.

The lifting force of the total force acts on the arm of the lever between the fulcrum and the center of the wheel hub at distances proportional to the distance from the fulcrum to the point of application of the total force on the driving axle of the vehicle. The nearer the driving axle is to the fulcrum, the greater is the leverage of the lifting component of the force about the fulcrum. The greater the leverage the easier is it for the wheel to mount the obstruction.

4—Yes. The wholesale price of a 3-horsepower direct-current motor-generator set would be about $150.

5—There are many other methods of transmitting power between two points, the distance between which is constantly changing, besides that of a flexible shaft, as follows: Electric current; hydraulic circulation; compressed air; vacuum, a scissors-shaped frame using any one of a number of forms of transmission, such as trains of spur gears, belts and pulleys, chains and sprockets, bell-cranks and connecting rods, etc. Transmitting 3 horsepower through a flexible shaft 4 feet long is practicable, providing the speed of the shaft is not excessive.

6—Comprehensive tests with motor trucks have shown that the average motor truck when fully loaded develops a drawbar pull equal to about one-fourth its gross weight; that is, weight of vehicle and load. This ratio is changed by road conditions and grades.

## COMMERCIAL VEHICLE ADVISES

### Windy City Manufacturer to Buy a Truck and Save High Hauling Costs

To the Editor COMMERCIAL VEHICLE: A little aid in this matter of economics will be highly appreciated:

Our firm pays in the neighborhood of $300 each month to a teaming company for hauling freight to and from stations, etc., and for the use of a single horse and wagon. This has been going on for years.

What we wish to find out is this:

Would it pay for us to purchase a 2-ton truck for the heavier hauling, counting the cost of supplies, repairs and driver's salary rather than to continue paying $200 for this heavy hauling each month. As it stands, we are not required to pay the teamster's salary but the teaming company charges so much per hundredweight for hauling.

We are absolutely in the dark in regard to the expense entailed in the maintenance of such a truck and would greatly appreciate any information you might be willing to give us on this subject.—M. W., Chicago.

While it would be folly to attempt to state what your costs would be without knowing the length in miles of the haul, you have, the weight and size of loads to be carried, the nature of traffic to be encountered, and the character of street surfaces to be traversed, it would certainly appear that a monthly bill of $300—or is it $200?—is sufficiently large to warrant very careful consideration of the advisability of motorizing your haulage and managing your own equipment.

There is only one reasonable necessity for the employment of hired teams at all times by an established concern such as that for which M. W. is purchasing agent, and that is that the volume of hauling to be done fluctuates so greatly that the vehicles, if owned by the plant, would stand idle so much of the time as to consume any saving on the teaming company's profits. Unless there is considerable fluctuation of this sort, there seems to be no good reason why the employment of outside help should be continued.

Even if the change to motor equipment were not made, it would obviously be cheaper to maintain the same horse equipment than to pay someone else to do so, always provided that the work is reasonably constant.

If your hauls total not less than 30 miles per day; if your loads do not exceed 2 tons in weight, and if your streets are fairly well paved, THE COMMERCIAL VEHICLE would advise the purchase of a 2-ton truck and the employment of an experienced operator who has been on a weekly salary of not less than $18 a week. If there is any number of passenger cars in the service of the officials of the concern, it would furthermore be advisable to provide a garage at the plant and a competent night man who can make small repairs and adjustments, who can be trusted to make a thorough inspection, and who is not above washing the truck. Perhaps some mechanic employed elsewhere might be induced to put in 2 or 3 hours an evening at this work for a reasonable sum.

See that loading conditions are arranged for the minimum delay in loading and unloading at the plant. Instruct the shipping clerk to always have room for the goods being brought in by the truck and to have his outgoing loads ready. He must also be instructed not to overload the truck beyond its rated capacity.

With more detailed information as to the work, a more specific answer may be given.

## CONTROLLER LOCK NOT NEW

### Electrical Manufacturer Denies That Kodak Device Is Novel

To the Editor COMMERCIAL VEHICLE: I note in your December 1 issue on page 18 an article describing a device used by the Eastman Kodak Co. on its electric trucks. This device is not a new one.

You also state that this device has not been patented because the designers stated that anyone wishing to take advantage of it could do so.

We believe that the real reason for not patenting it is because this device has already been in use for some time by several manufacturers of electrical equipment.—George J. Kirchgasser, Cutler-Hammer Mfg. Co., Milwaukee, Wis.

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# Accessories for the Truck

## ESCO CAST STEEL WHEELS

Made in Switzerland and handled by the Electric Steel Castings Co., Ltd., Sheffield, Eng., Esco cast steel motor truck wheels can now be secured in large quantities by exporters of American-made trucks who are desirous of equipping their vehicles with steel wheels for demountable millimeter-sized solid tires. Esco wheels are of the hollow-spoked type and are featured by the use of a rim at a slight angle to the wheel spokes with triangular-sectioned segments bolted to the felloe to keep the tire in place. These segments act as wedges between the slanting rim and the steel base of the tire, the inside edge of the latter abutting a flange on the inner circumference of the rim. The segments also have a short flange on their outer circumference, but this does not bear against the base of the tire which is held in place by the wedging action of the segments. A cross-section of the rim, tire and segment is shown in Fig. 3.

The design of the Esco rim differs from that of standard American practice in that the rim is slanted in relation to the spokes instead of at right angles. The American design has a restraining hand on the outside, bolted to the wheel felloe, which holds the wedge ring in place, the latter bearing directly against the steel tire base. As against these two members necessary to keep the tire in place, the Esco design has but one.

It is a question whether the two smaller parts of the American type do not weigh less than the one of the Esco design and also as to which type permits of the quickest tire removal. Esco wheels for dual tires are made on the same principle as the one-tired wheel. Both inside and outside views of front and rear Esco wheels are shown in Fig. 3.

## WORDEN'S COMBINATION PLIERS

Useful for the motor truck driver or shop mechanic, Worden's combination pliers, made by E. M. Worden, Ladysmith, Wis., can be used for fifteen different operations from the pulling of cotter pins to punching holes in a leather fan belt. The pliers do not differ much in appearance from the conventional mechanic's pliers except that one handle end is pointed for punching holes and the other squared off for use as a screw driver. The surface where the handles are joined is flared out in a circular shape and hardened so that slots may be cut in each half for wire cutting.

The jaws are slightly concave on their inner edges and saw-toothed to act as a pipe wrench. The extreme ends of the jaws are squared off and slightly serrated to provide a good hold on cotter pins, wires, nails, etc. The pliers are shown in Fig. 4.

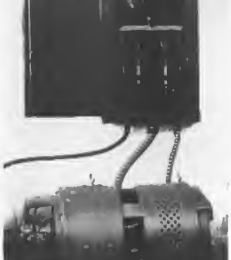

Fig. 1—The Lincoln battery charging outfit adaptable for use by owners of a small number of electric trucks

Fig. 2—The new Shaler electric tire vulcanizer

## LINCOLN BATTERY CHARGER

Particularly adaptable for use by owners of a small number of electric trucks which are kept in unattended garages, the Lincoln battery charging outfit shown in Fig. 1 consists of a small motor-generator set with wall switchboard inclosed in a metal casing. It is designed to charge lead batteries of not greater than 40 cells and gives a tapering charge. The battery to be charged may be connected at night and left unattended until the morning following. If the current source should be interrupted and the device stopped, it will automatically restart itself.

Both the motor and generator are mounted in one casing which may be located on the floor, workbench or other convenient position. Armored cables are used to connect it with the switchboard, which is mounted on the wall. The motor is of the single-phase squirrel-cage induction type. The generator is of the constant-voltage, compound-wound type. They are directly connected and carried on self-aligning ball bearings.

As the induction motor is not self-starting, the set is designed to start from the direct current end, taking a small amount of current from the battery to be charged. As soon as the unit is brought up to the required speed by this means, the panel switch is thrown to a new position, throwing the alternating current across the motor. This starts the set to charge the battery.

In case the power goes off the line during the night, the set will continue to operate, taking a small amount of current from the battery being charged until the current is again flowing on the alternating current line, when the set begins to charge the battery.

The tapering charge considered good practice in the charging of lead batteries is secured by compounding the winding of the generator so as to produce a constant voltage. When the battery charge is started there is a certain difference in voltage between the machine and the cells. As the charge proceeds this difference decreases, due to increasing absorption of charge by the battery. As the charge is built up and the battery voltage increases while the generator voltage remains constant, the resistance to the current flow increases and thus produces the tapering charge. The apparatus is made by the Lincoln Electric Co., Cleveland, O.

## SHALER ELECTRIC VULCANIZER

Similar in design to Shaler steam vulcanizers, the new type shown in Fig. 2 differs in that the heat is obtained from current taken from an ordinary lighting circuit by a cable attached to a light socket. The type shown consists of a pipe-frame bench with a triangular-shaped top mounting four tube vulcanizers on each of two sides and one cas-

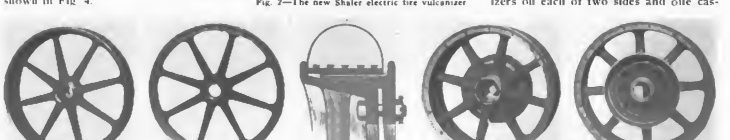

Fig. 3—Esco steel wheels, made in Switzerland and handled by the Electric Steel Castings Co., Sheffield, Eng., can now be secured in quantity by exporters of trucks from this country. Above, at the left, side views of a front wheel; right, side views of a rear; center, section through rim, showing novel wedge segment for quick tire removal

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ing vulcanizer on the other. The outfit has a capacity of 200 tubes and twelve casings per day. Despite the large possible output, the outfit is also useful for the small shop which wants to give good service even though the tire repairs are infrequent, because the vulcanizing temperature is obtainable as quickly as a tube can be prepared.

One of the chief advantages of the use of electricity for heat is that it is safe and that it does not conflict with garage regulations. The vulcanizing heat is controlled automatically by thermostats, rendering it almost impossible for a careless operator of the device to damage the part being vulcanized by too high a temperature.

Although offered in a complete unit as shown in Fig. 2, the separate parts comprising the device may be purchased separately if so desired, for attachment to any workbench to meet the particular conditions of each buyer. The apparatus is manufactured by the C. A. Shaler Co., Waupun, Wis.

## FRIESTEDT RIM CONTRACTOR

Changed slightly in detail, although not in principle, the 1916 Friestedt rim contractor opens, contracts and relocks both straight-sided and clinches split demountable tire rims without clamps to adjust or bolts to tighten. The device is made by the Friestedt Rim Contractor Co., 2934 west Lake street, Chicago, and is shown in Fig. 6.

It consists of two main parts, a U-shaped frame with small pivoted lugs at the open ends which grip the rim, and a handle pivoted to the bottom of the frame. A lug for opening the rim locks is pivoted to the bottom of the handle. A hook is provided at the free end of the handle to hold the rim in its deformed position while the tire is being taken off or put on.

Fig. 4—Worden's combination pliers which can be used for fifteen different operations

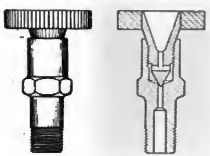

Fig. 5—Exterior and sectional views of Ideal priming cups. Note the needle valve

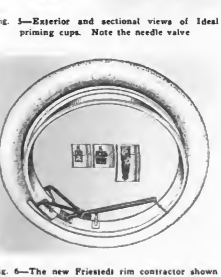

Fig. 6—The new Friestedt rim contractor shown in place. The device will open the rim locks shown at the center

## IDEAL PRIMING CUP

Entirely different from the conventional type of priming cup for motor vehicle gasoline engines, the Ideal cup, made by the Ideal Brass Wks., Indianapolis, Ind., is designed on the needle-valve principle. It consists of two parts, a special pipe nipple and a cap which screws into it. The nipple is threaded on the outside at the bottom so that it may be screwed into the cylinder. It is also threaded at the top, but on the inside, to permit the cap to be screwed into it. A hexagonal nut boss is provided on the outside of the nipple at its midpoint to enable it to be screwed into the cylinder by means of a wrench.

The cap is funnel-shaped at the top with a needle valve at the bottom which seats on a coned surface cut in a shoulder in the interior of the nipple. The lower half of the cap is threaded for screwing into the top of the nipple. This is done by means of a hollow circular fiber washer slipped over the top of the cap.

In operation, when it is desired to prime a cylinder, the funnel-shaped cap is filled with gasoline. The cap is then screwed out of the nipple, raising the needle valve off its seat and allowing the gasoline to feed into the cylinder.

The advantages claimed for this type of cup as compared with the conventional design are that it does not leak under the highest compression, and that it can be operated with the thumb and finger, without the aid of tools and without burning the fingers, through the use of the fiber disk.

Exterior and section views of the assembled cup are shown in Fig. 5.

## IMPERIAL MULTI-ANGLE WRENCH

Combining both a plain and ratchet wrench in one, the Imperial multi-angle wrench consists of a handle with the wrench jaws pivoted at one end. The stationary jaw member is integral with a ratchet which is slipped between a slot in the handle end and held in place by a pivot screw through both parts. When desired, the ratchet is released by means of a dog in the handle slot which is operated by means of a small button.

In operation, the jaws can be moved to eight different positions. It will take any nut up to 1¼ inches. When the nut to be turned is in a position hard to get at, it can be turned by ratcheting the handle one or more notches in either direction by pressing the ratchet button. When the latter is released, the handle is locked rigidly. The wrench is made by the Imperial Tool Co., Bloomington, Ill. It is shown in Fig. 7, the dotted positions of the jaws indicating the maximum degrees to which they may be turned.

## SPLIT WINDSHIELD RAIN GUARD

Designed to keep the rain from dropping off the bottom edge of a split windshield and into the horizontal joint between the top and bottom halves onto the legs of the driver, the rain guard shown in Fig. 8 consists of a transparent strip attached to the lower edge of the top half. This is held in place by means of a trough-shaped metal strip forced over the lower edge of the top glass. The rear side of the strip is bent backward on itself, somewhat in the shape of a U. The transparent strip is forced between the arms of the U, extending from the rear of the top glass, through the joint to the front side of the lower glass. By this means, no matter what the angle of the top half as compared to the bottom, no water can get through the joint, as it runs down the transparent strip and drips off on the lower half of the glass. It can be attached to any make of windshield in a few minutes' time. The device is made by the Clear View Rain Guard Co., 205 west Lombard street, Baltimore, Md.

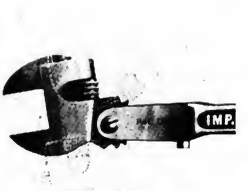


Fig. 7—The Imperial multi-angle wrench combining both plain and ratchet wrench in one. Dotted lines show extreme positions of jaws

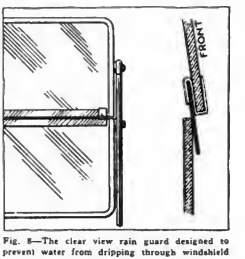


Fig. 8—The clear view rain guard designed to prevent water from dripping through windshield joint

**"Economy in Good Motor Truck Springs,"** is the title of a small four-page leaflet recently published by the Detroit Steel Products Co., Detroit, which points out the error of fitting one design of springs to all trucks of a similar type. It then takes up the question of proper spring design for various types of trucks, the kind of material used and the proper method of heat-treating springs after the machining and shaping operations have been completed. The treatise is written by Mason P. Rumney, engineer of the Detroit company and the son of its president. The information contained in the leaflet is short and concise and should prove of interest to owners of trucks whose springs are not giving complete satisfaction.

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# Men and Makers

**COLUMBIA MOTOR TRUCK & TRAILER CO.,** which moved to Pontiac from Kalamazoo, has let the contract for its new plant, which will be a one-story structure, 60 by 250 feet.

**Packard Motor Car Co.,** Detroit, is planning the erection of a new service station in Pittsburgh, Pa., at Baum boulevard and Enfield street. It will be four stories high in front and three at the rear. It will be of brick, steel and terra cotta construction and will cost approximately $20,000.

**Willys-Overland Co.,** Toledo, O., has prepared plans for the erection of a new service building in Boston, Mass., for its New England distributors, Connell & McCone. The new structure will be located in the Back Bay section of Boston. It will be a three-story fireproof building of steel and concrete, with a frontage of 105 feet on Brookline avenue and 260 feet on Butler street. It will have 81,900 square feet of floor space. In order to provide for future expansion, the Overland company has acquired the property adjoining the new structure on the west and extending as far as the Boston & Albany R. R. tracks. This will give it an additional 140 feet along Butler street and 235 feet on Burlington avenue. In addition to the service building the company will erect a model retail sales building on Beacon street, near Deerfield street. This will be one story in height and will cover a plot with an area of 6,600 square feet.

**Baker Motor Sales Co.,** Cambridge, Mass., distributor of Selden trucks, has taken over the entire service plant of the Knox Motor Associates, located on Green street. It is directly in the rear of the salesrooms of the Baker company and gives an additional 10,000 square feet of room for service purposes, all on one floor.

**Bosch Magneto Co.,** New York City, is erecting a building at its Springfield, Mass., plant which will provide more than 60,000 square feet of additional floor space. The new structure is a one-story building with a frontage of 175 feet. It will be joined to the main plant by a connecting building and shipping hall, which will also provide considerable new space. The outside walls of the new structure are of brick and concrete, in keeping with the design of the present plant. It will have a saw-tooth roof providing maximum light and ventilation. The windows are especially large and are set in steel sash. The new building will be used for lathe and similar work. Practically all of the machinery has been delivered at the site and is now being installed as rapidly as possible. The shipping hall can accommodate five freight cars at one time, thus enabling large quantities of material to be loaded or unloaded entirely within the building. A new siding has been laid from the main line of the Boston & Maine R. R. to the shipping hall, which with the old siding gives two lines of ingress and egress from the Bosch plant.

**Doehler Die Casting Co.,** Toledo, O., has drawn plans for the erection of three new factory additions to cost approximately $70,000. All are to be of brick, steel and concrete. One building will be two stories and basement in height, 50 by 260 feet, and will cost $42,747. A new foundry structure, 50 by 180 feet, one story and basement, will cost nearly $9,000. The third structure, a warehouse, 50 by 160 feet, one story and basement, will cost nearly $17,845.

**Salisbury Wheel & Mfg. Co.,** Jamestown, N. Y., is planning additions to its plant which will give an additional manufacturing floor space of more than 30,000 square feet. Among the additions is an added story to the brick dry kiln used for drying the wheel felloes. A new endless-chain conveyor will connect the new floor to the factory proper. It is expected that all of the new construction work will be completed by March 1.

**Reliance Engineering Co.,** Lansing, Mich., which recently took over the Seager Engine Wks., has just taken over the Michigan Crankshaft Co. and the Emergency Forge Co. The Michigan company started in business in 1907 and the Forge company in 1910.

**Electric Steel Casting Co.,** Milwaukee, Wis., was recently formed for the making of electric-furnace steel castings for passenger car and motor truck manufacturers and will build one of the first foundries in the United States designed exclusively for electric furnace work. The structure will be 80 by 500 feet and will be equipped with two 3-ton electric furnaces. It will be ready to make castings about April 15.

**T. W. Warner Co.,** Muncie, Ind., has two additions to its plant in that city under course of construction. The estimated cost of the new buildings is $100,000.

**Standard Crucible Steel Casting Co.,** Milwaukee, Wis., is constructing a new foundry addition to its plant. The building is 40 by 80 feet, of brick and reinforced concrete.

**Perfection Coil Spring Co.,** Jackson, Mich., is building a 150- by 36-foot addition to its plant to provide facilities for an increased output. The Perfection company specializes in valve springs for motor vehicle use.

**B. F. Goodrich Co.,** Akron, O., has obtained a lease on the five-story and base-

America's generosity to foreign peoples in time of misfortune and distress, the reputation for which she has held for many, many years, is well shown by the above illustration which pictures some of Philadelphia's foremost women who have organized under the name of the French Relief Committee, and a White 1½-ton which the committee purchased and sent to France for relief work. The picture was taken at the Philadelphia, Pa., branch of the White Co., just before the truck was shipped abroad. As shown, the vehicle is equipped with the standard type of French truck body with tarpaulin top and a protected driver's cab

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ment terminal warehouse at Twenty-fourth street and Broadway, Kansas City, Mo., and will immediately start alterations to suit it to its requirements. The entire output of the Goodrich company for the central western territory will pass through the new warehouse. All business in the western territory will now go to Kansas City instead of Akron. This amounts to a yearly total of about $2,000,000. The sales headquarters at the warehouse will be under the supervision of F. A. Oberhue.

**Goodyear Tire & Rubber Co.**, Akron, O., will soon establish branches at Salina, Kan., and Cedar Rapids, Ia., to better provide for its increasing business in those localities. The Salina branch will be under the supervision of R. S. Herman, formerly salesman representing the Goodyear company at Kansas City, Mo. C. A. Cramer, of the Goodyear force at Des Moines, Ia., will become manager of the branch at Cedar Rapids.

**Fire at the Plant of the French Battery & Carbon Co.**, Madison, Wis., destroyed practically all of the buildings. The estimated loss is in excess of $100,000. The fire occurred on the night of December 1. The company is a large manufacturer of dry cells, fuses, etc., and has been filling large contracts for both domestic and export shipment. It is understood that the plant will be rebuilt at once to take care of a large volume of unfilled orders.

**Officers of the Chase Motor Truck Co.**, Syracuse, N. Y., were elected at a recent meeting of the directors of that company. They are as follows: A. M. Chase, president and chairman of the board of directors; H. P. Berlinger, vice president; E. A. Kingsbury, secretary and treasurer; H. T. Boulden, general sales manager, and J. E. Gramlish, chief engineer. The Chase company will celebrate its tenth anniversary in the motor truck field on February 15, 1916.

**Officers of the Stewart Motor Corp.**, Buffalo, N. Y., were recently re-elected for 1916. They are as follows: T. R. Lippard, president and general manager; R. G. Stewart, vice president and chief engineer, and R. P. Lentz, secretary and treasurer. The board of directors of the corporation also consists of the three officers named above. The Stewart capital was also increased from $250,000 to $325,000.

**C. S. Jameson**, vice president and director of the Willys-Overland Co., Toledo, O., who has been in ill health for several months, has resigned as an officer and director of the company to take a 2-year leave of absence. Mr. Jameson has left for Florida, where he will spend the winter.

**B. W. Burtsell**, formerly assistant factory manager of the Packard Motor Car Co., Detroit, and before that with the Brown & Sharpe Mfg. Co., Providence, R. I., assumed the position of sales manager for the Whitney Mfg. Co., Hartford, Conn., on January 1. Mr. Burtsell will be assisted by Messrs. W. W. Totman and H. L. Sevin.

**S. W. Schooley**, formerly special factory representative of the Atterbury Motor Car Co., Buffalo, N. Y., last week became associated with the Kearns Motor Car Co., Beavertown, Pa., in the capacity of vice president and general sales manager.

**Louis P. Helm**, formerly general manager of the Wisconsin Motor Truck Wks., Baraboo, Wis., has become vice president and sales manager of the Myers Machine Co., Sheboygan, Wis.,

**Philadelphia's reputation for slowness has been given a severe jolt by one of the distributors of motor trucks in that city who employs a woman who not only sells trucks but also demonstrates them both before and after the sale. The young lady is Miss Wright of the Commerce Philadelphia Sales & Service Co., distributor of Commerce 1,500-pound delivery vehicles. Miss Wright teaches the purchaser of the truck or his employes how to drive it, contending that its ease of operation is proven if she can drive it. She is shown with her winning smile in the above illustration**

which recently took over the business and interests of the Wisconsin company. The Myers concern is at present erecting a large addition to its plant to take care of the motor truck end of the business. It expects to be able to make deliveries of the Wisconsin truck about January 15.

**Edward T. Birdsall**, president of the Kosmath Motor Truck Co., Detroit, has been appointed consulting engineer to the O. Armleder Co., Cincinnati, O., and is said will redesign the present Armleder trucks.

**G. E. Porter**, designer of the Wilson truck, made by the J. C. Wilson Co., Detroit, has resigned.

**Albert E. Mais** has resigned as chief engineer of the H. G. Burford Co., Fremont, O., maker of the Burford truck, and accepted a similar position with the Morton Truck & Tractor Co., Harrisburg, Pa.

**R. B. Daggett**, formerly manager of the Boston, Mass., branch of the Commercial Truck Co. of America, Philadelphia, Pa., will succeed Emlen S. Hare as sales manager at the factory in Philadelphia. Mr. Hare's resignation takes effect January 1. He still remains a stockholder and vice president of the company.

**L. Barnabas** has succeeded J. D. Cameron as manager of the Chicago salesroom of the International Harvester Co. of America. The change took place on December 1 last. Mr. Barnabas has been connected with the International Harvester company for many years in various capacities.

**H. A. Neill** has been appointed manager of the Kansas City, Mo., branch of the General Motors Truck Co., Pontiac, Mich., succeeding Estel Scott, who recently resigned due to ill health. Mr. Neill was formerly direct representative of the same company in Atlanta, Ga.

**Fred J. Sweet**, New England manager of the Chicago Pneumatic Tool Co.'s branch at Boston, Mass., made a trip through southern New England last week demonstrating the Little Giant 1-ton truck to dealers. He placed an agency for it with the Forest Park Garage, Springfield, Mass., and he has other dealers considering the line. He visited Providence, Hartford, Middleton, New London, Springfield, Northampton, Pittsfield and Worcester.

**Albert S. Holly**, manager of the Boston, Mass., branch of the R. E. Taylor Corp., Garford truck distributor in New England, had S. M. Williams, general sales manager from the Garford factory at Lima, O., as his guest at the convention of road builders held last week at Worcester, Mass. They distributed much literature on good roads which had been gotten up by the Garford company.

**Ira Miller**, for a number of years active in the advancement of electric truck interests as agent in western Massachusetts for the Couple-Gear Freight Wheel Co., Grand Rapids, Mich., manufacturer of the Couple-Gear electric and gas-electric trucks, died in Little Rock, Ark., on December 16.

**C. S. Dahlquist** has recently been made shop superintendent for the Timken-David Brown Co., Detroit. He will pay particular attention to that department making worm gearing for motor trucks. Mr. Dahlquist was chief engineer for the Lippard-Stewart Motor Car Co., Buffalo, N. Y., for the past 4 years. Previous to that he was identified with the Velie Motor Vehicle Co. and the International Harvester Co., being chief engineer of the latter concern's motor vehicle department.

**W. L. Gleason**, previously assistant factory manager of the Timken-Detroit Axle Co., Detroit, has been promoted to assistant to the vice president of that company in charge of manufacturing.

**J. C. Regan** has been appointed general factory manager for the Timken-Detroit Axle Co., Detroit. Mr. Regan was formerly with Yale & Towne, Stamford, Conn., for the past 13 years and until recently assistant general superintendent for that concern.

**W. E. Taylor**, a graduate engineer of Purdue University and until recently with the Ross Gear Co., Lafayette, Ind., has joined the Timken-David Brown Co., Detroit, in a selling and engineering service capacity.

**F. W. Topken**, for 11 years chief engineer of the Chicago Pneumatic Tool Co., Chicago, is now in complete charge

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of the mechanical and garage departments of the Hunter-Smith Sales Co., Tacoma, Wash.

**Frank DeWitt,** manager of the Detroit office of the Electric Products Co., Cleveland, O., for the past 2 years, has recently been appointed director of sales for the American Distributing Co., Detroit.

**Charles L. Beck,** general foreman of the Hayes Wheel Co., Jackson, Mich., has been appointed assistant general manager of the firm's new plant in Anderson, Ind. His successor is Henry Flick, formerly assistant manager of the Jackson plant.

**C. H. Brennan** has been appointed manager of the Detroit branch of the Hale & Kilburn Co., North Philadelphia, Pa. He will make his headquarters in the Garfield building, Woodward avenue. The Pennsylvania company makes motor vehicle fenders, axle housings, frames, etc., etc.

**W. C. Andrews,** advertising manager of the Edison Storage Battery Co., Orange, N. J., died suddenly in New York City on December 21. Mr. Andrews was 60 years old and had been in ill health for some time. He was well known in the motor truck field and was an active worker in both the Electric Vehicle Assn. of America and the New York City Section of the Motor Truck Club of America, Inc.

**Goodyear Officers for 1916** were elected at the annual meeting of the Goodyear Tire & Rubber Co., held recently at its Akron, O., plant. They are as follows: F. A. Seiberling, president; G. M. Stadelman, P. W. Litchfield and C. W. Seiberling, vice presidents; F. H. Adams, treasurer; A. F. Osterloh, secretary; W. E. Palmer, assistant secretary and assistant treasurer, and H. J. Blackburn, second assistant treasurer. Of these elections, three were promotions of men already in the Goodyear organization. A. F. Osterloh was formerly assistant secretary; P. W. Litchfield, who has been with the Goodyear company as factory manager almost since the concern was formed, was elected one of the vice presidents; G. M. Stadelman was formerly secretary and sales manager. He continues as sales manager but in addition is now a vice president. The financial report rendered at the same meeting showed that more than $36,000,000 worth of business was transacted during 1915, as compared to $31,000,000 worth in 1914.

**L. K. Rittenhouse,** manager of the St. Louis, Mo., branch of the B. F. Goodrich Co., Akron, O., and who has been identified with the Goodrich and Diamond rubber companies for the past 10 years, has resigned.

**Joseph F. Mayl,** formerly sales manager of the St. Louis, Mo., branch of the Firestone Tire & Rubber Co., Akron, O., has been appointed branch manager for the same concern at Memphis, Tenn.

**C. E. Davis** has been appointed manager of the Portland, Ore., branch of the McGraw Tire & Rubber Co., East Palestine, O., which has established quarters at 344 Burnside street in that city.

**George B. Hendrick,** formerly sales manager of the George H. Ellis Co., Boston, Mass., has been appointed manager of the newly-created publicity department of the Fisk Rubber Co., Chicopee Falls, Mass.

**Ernest Hopkinson,** in charge of all patent matters for the United States Rubber Co. for the past 15 years, has been elected vice president of that concern. Mr. Hopkinson is recognized as a world authority on tire patents.

**Robert C. Emos** was elected vice president and general manager of the American Distributing Co., Detroit, at a recent meeting of the stockholders of that concern.

**L. G. Reynolds, Jr.,** formerly with the National Cash Register Co., Dayton, O., and Ralph Kaye, New York City, have joined the advertising department of the Stewart-Warner Speedometer Corp., Chicago, to assist Advertising Manager Gridley Adams.

**H. D. Crippen** succeeds Edward A. Cassidy as general sales manager of the motor vehicle accessory department of the H. W. Johns-Manville Co., New York City. Mr. Crippen assumes his new duties on January 1. He was formerly with the United Profit Sharing Corp., New York City.

**L. M. Crittsinger** has recently been appointed factory manager for the Emil Grossman Mfg. Co., Brooklyn, N. Y.

**L. L. Sanford,** formerly manager of the Indianapolis, Ind., branch of the Stewart-Warner Speedometer Corp., Chicago, has recently been placed in charge of all the service stations of the same company. He will make his headquarters in Chicago.

**Motor & Accessory Manufacturers' Banquet** for 1916 will be held at the Waldorf-Astoria hotel, New York City, on Wednesday evening, January 5. It will be the eighth annual banquet of the accessory organization.

**Packard Truck Salesmens' Convention,** recently held at the Packard plant in Detroit, was attended by the sales managers of Packard branch locations in the seven principal cities of the east and middle west. Each representative predicted that 1916 will be the biggest year in the motor truck industry. Those who attended included H. S. Norton, Cleveland, O.; F. A. Jones, Chicago; Hartley Howard, Jr., Pittsburgh, Pa.; W. F. Roth, Philadelphia, Pa.; T. P. Myers, New York City; G. F. Pagett, St. Louis, Mo.; S. L. Prime, Boston, Mass., and C. C. Spencer, Detroit.

**"Fire Prevention"** was the title of a paper read before the monthly gathering of the National Rotary Club, Kansas City, Mo., on December 16, by G. Louis Allen, sales manager of the Pyrene Mfg. Co., New York City. Mr. Allen is making a flying trip through the south and middle west and attending sales conferences of the agents of the Pyrene company in the principal cities in that territory. He left New York City on December 4 and before returning to that city will visit Atlanta, Ga., Dallas, Tex., Des Moines, Ia., St. Paul, Minn., Chicago, Ill., and Pittsburgh, Pa.

**International Motor Co.'s Postal Card,** sent out with other literature of the company to prospective owners of trucks, is of the duplex type, that is, two cards of the conventional size, perforated at one end. One card is self-addressed and on the reverse side contains blank spaces to be filled in by the receiver giving his name and the kind of truck equipment he would be interested in. The other card gives a list of the approximate weights of various materials in pounds per cubic foot. This card is intended to be kept for ready reference.

**The Syndicate Club,** formed of executives of the Garford Motor Truck Co., Lima, O., and officials of parts and material companies doing business with the Garford concern, recently held its first annual outing at Orchard Island, near Lima. Fifty-two men prominent in the motor truck industry took part in the festivities, which lasted for 2 days. One day was given over to sporting events and part of the other to speechmaking. E. A. Williams, Jr., president of the Garford company, spoke on its aims, and S. M. Williams, sales manager, spoke on co-operation among those within the Garford organization and expressed appreciation of the co-operative spirit shown by representatives of different concerns from which the company is purchasing raw materials.

**"June Efficiency in January"** is the title of Motor Truck Bulletin No. 11, just issued by the Packard Motor Car Co., Detroit, which delineates the satisfactory work which a fleet of seven Packard trucks has rendered to W. R. Keith, of the Independent Oil Co., Brockton, Mass. The bulletin is a four-page pamphlet with a very attractive cover showing one of the Independent company's trucks in summer and in winter, the latter view showing the truck covered with snow and ice. The picture of the truck in summer is shown on a calendar leaf for the month of June, and the winter view on a leaf of January, thus carrying out pictorially the title of the bulletin. The booklet also shows a view of the truck fleet and the Packard truck motor and worm-gear driving unit.

**Second High Compression Ring Co.'s Booklet,** celebrating the completion of the company's new factory at Rockford, Ill., and extending the season's greetings in a twelve-page, ribbon-bound pamphlet giving three views of the new factory and in addition the names of the officers of the company and the location of its branches. The factory views are pasted in photographs, in a true elliptic shape. The new factory consists of one building, one story high, with a monitor roof. It is 190 feet long, 129 feet wide and has 19,000 square feet of manufacturing space. It will accommodate a force of 250 men which is capable of turning out 25,000 pistons rings per day.

**"Ball Bearings in Commercial Applications"** is the title of a treatise on ball bearings just issued by the New Departure Mfg. Co., Bristol, Conn., which is one of the most notable pieces of literature on the subject of ball bearings that has ever been published. While the book is published by the New Departure company, manufacturer of ball bearings, only the first and last chapters are devoted to New Departure bearings. The remainder of the book is divided into seventeen chapters, each dealing with the use of ball bearings in one of the following classes of work: gasoline engine crankshafts; power plant auxiliaries; motor truck clutches; motor truck gearsets; motor truck jackshafts; double-reduction and internal-gear-driven rear axles for motor trucks; worm-driven truck axles; motor truck wheels; electric motor trucks; trolley car axle journals; agricultural tractors; electrical industrial trucks and tractors; gasoline and electric locomotives such as used in mining operations; motor road tractors; motor-driven fire apparatus; aeroplanes and boat engines of the gasoline type. Each of the chapters is profusely and artistically illustrated with half-tones, bringing out the various uses of ball bearings. A two-page plan view of a truck chassis, showing where ball bearings may be used to advantage, is also given. The book is published on white glazed paper, 9 by 12, with an art cover. It may be obtained gratis from the New Departure company.

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# WHITE TRUCKS

## *Awarded the* GRAND PRIZE

## BY THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION AT SAN FRANCISCO

### THE ONLY GRAND PRIZE—THE HIGHEST AWARD FOR MOTOR TRUCKS

Was conferred upon White Trucks by the Superior Jury of Award, as officially announced by the Secretary of the Jury under date of August Second.

This is the ONLY GRAND PRIZE received by any motor truck at the Panama-Pacific International Exposition.

This decision of the Superior Jury of Award reflects the opinion of the largest users of motor trucks throughout the world—and is in accordance with the actual service results of motor truck experience. The points of merit upon which the Grand Prize is awarded are identical with those that have determined the selection of White Trucks by America's foremost firms in every line of business.

White supremacy in the motor truck industry is thus recognized by the highest award that can be bestowed by the greatest exposition the world has ever known—just as this supremacy has been recognized by motor truck users for many years.

### REGARDING OTHER CLAIMS

The decision of the Superior Jury is final in the matter of Exposition awards. Hence any announcements of other motor truck manufacturers, claiming to have received the Grand Prize and Highest Award for motor trucks at the Panama-Pacific International Exposition, are automatically denied by this decision of the Superior Jury of Award.

THE WHITE COMPANY
CLEVELAND

*Largest Manufacturers of Commercial Motor Vehicles in America*




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**The Key**
to motor truck
efficiency is

## Cost Records

Efficiency is the accomplishment of much at little cost.

One must therefore know his costs before he may know his efficiency, and whether any improvement is needed.

T. D. Pratt, president of the Motor Truck Club of America, in an address before the Motor Truck Club of New Jersey on December 21, stated that there was a need of standardization in cost keeping, of uniform systems, so that data might be compared.

His organization has approved a cost-keeping system which was introduced over a year ago. It was compiled and published by

The COMMERCIAL VEHICLE

Watch for an announcement of a new plan by which every motor truck user in the United States may obtain a set of these forms for the bare cost of publication.

Office of Publication
239 WEST THIRTY-NINTH STREET
CITY OF NEW YORK



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# Pierce-Arrow Trucks Saved Holbrook, Cabot & Rollins $550 Per Day On Million Dollar Newark Terminal Contract

These well-known contractors employed from ten to twelve Pierce-Arrow motor trucks continuously on the big excavating contract for the Public Service Terminal at Park Place, Newark, N. J. The job called for the removal of earth from an excavation 900 feet long with an average width of 140 feet and a depth of 25 feet below the curb.

In estimating what the cost of doing this work with horse teams would have been it was figured that there was a saving of approximately 60 per cent. in favor of the motor trucks. The net saving on this basis would amount to $550 per day. Mr. T. B. Bryson, Vice-President of the Holbrook, Cabot & Rollins Corporation, writes us on this point:

*"Replying to your letter of December 3rd, regarding Pierce-Arrow trucks on work at Newark, would say that it would be impossible to have done the work in question with horse trucks on account of the length of the haul and also the fact that we could not have gotten the teams to the shovel and away with dispatch enough to have loaded the yardage which we were loading per day."*

The trucks were worked eighteen hours per day with two shifts of drivers, averaging 154 miles per day. The operating expense was 18 cents per mile and the yardage cost figured out approximately 32 cents per yardage removed.

All Pierce-Arrow Trucks are equipped with the worm-gear drive, which is a positive guarantee of effective service under the most difficult conditions.

Other interesting details of costs, loading facilities, etc., are given in our recently published booklet, "What Pierce-Arrow Motor Trucks are Doing in the Contracting Business," which we shall be glad to send to any contractor interested.

PIERCE-ARROW MOTOR CAR CO.
BUFFALO NEW YORK

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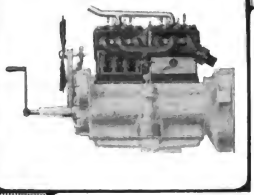

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Recent motor development has produced no engine wherein efficiency and economy meet more exactly in accord with the requirements of 3-, 3½-, 4-ton commercial chassis.

Ask for details of our Model D 4⅜ x 6 Motor.

**North American Motor Co.**
Pottstown, Pa.

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**High Grade Driving Chains**

are made by specialists in a modern fire-proof factory. All materials used are chosen for quality regardless of cost.

Our aim is dependability of service and our success in this is shown by the use of our chains on the leading makes of trucks throughout the country.

Send for our booklet giving sizes and lengths of "Whitney" Chains required for chain-driven motor vehicles.

**The Whitney Mfg. Co.**
Hartford, Conn.

*Chains—Keys—Hand Milling Machines*


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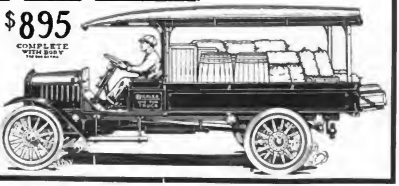

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4 Ton

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**A Gear With a Worm and Split Nut**

Not the usual worm and pinion device.

Split nut combination with trunnion gives double strength.

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## Questions and Answers
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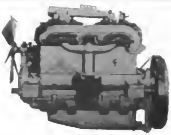

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Detroit, Mich., 402 Woodward Ave.



## The Long Distance Electric

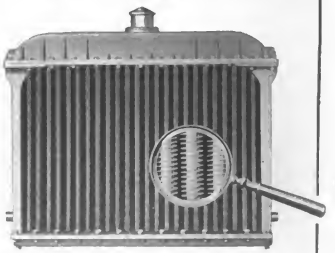
In all problems of heavy service electricity is the most dependable, economical, and satisfactory power. **Atlantic** Electric Trucks are built in ½, 1, 2, 3½ and 5-ton models. Guaranteed to give 15% more mileage than any other electric truck of equal capacity and same equipment.

Hundreds of users unhesitatingly endorse the known superiority of Atlantic Long Distance Electric Trucks. Our new models have every proven safety factor in construction; modern steering apparatus, allowing driver extreme latitude and flexibility in traffic, maximum traction, smoother rolling, scientific load suspension, etc. Every truck carries with it a guarantee of faithful performance, adequate service, and mileage plus beyond your requirements.

The experience of our experts in handling delivery problems will be of value to you. Let us know your requirements. Our recommendations entails no obligation.

**Atlantic Electric Vehicle Co.**
**Vanderbilt Bldg., New York**
**Main Office and Factory, Newark, New Jersey**

## Seamless Copper Helical Tube Cooling Sections



*Are Guaranteed for the Life of the Motor on Which They are Installed*

Helical Tube Construction is Accepted as the Best by the Leading Truck Makers of America

*Manufactured only by*

ROME-TURNEY RADIATOR CO.
ROME, NEW YORK

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# SAFETY

—devices protect chauffeurs who operate machines equipped with COTTA Transmissions.

Special COTTA equipment provides a locking device, which positively prevents engagement of two speeds at the same time.

Regardless of speed of car or rotation of gears, speed changes are made easily and instantly with the COTTA Transmission.

Have your next car COTTA safe-guarded.

**Cotta Transmission Company**
814-18 S. Main St, Rockford, Illinois

One of six Jeffery Quads in the service of the United States Army Signal Corps. This is the most powerful portable wireless station in the world. The Jeffery Quad drives, brakes and steers on all four wheels.

The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin

# NEW DEPARTURE BALL BEARINGS

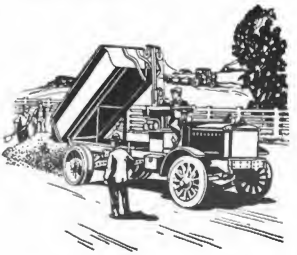
**American Made for American Trade**

## Strength • Service Economy

are imparted to any motor truck through their use and 82% of American manufacturers of pleasure cars, trucks, and tractors now use New Departure Ball Bearings in their several models.

New Departures in your truck will increase its life, decrease its up-keep cost, and outlive the vehicle itself. Manufacturers and bona fide purchrsers of commercial cars should read our new book—"Ball Bearings in Commercial Applications." Send for it.

Manufacturers and bona fide purchasers of commercial cars should read our new book —Ball Bearings in Commercial Applications. Send for it.



**THE NEW DEPARTURE MANUFACTURING CO.**
Bristol, Conn, U. S. A.
Conrad Patent Licensee
WESTERN BRANCH: 1016-17 FORD BLDG., DETROIT, MICH.
Distributors in Trade Centers Throughout the United States
Sole British Agents: Brown Bros., Ltd. London and Manchester
For Continent of Europe:
Jacob Holst, Copenhagen, Freeport, Denmark

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THE BUDA COMPANY
BUDA MOTOR
"The part to buy the car by"
ESTABLISHED 1851

# 250% Increase

in the output of fine Automobile and Truck Motors by the Buda Company (not "war orders") should make careful manufacturers do some thinking.

May we have the pleasure of exhibiting some points of Buda superiority

## AT THE SHOWS

| NEW YORK | CHICAGO |
|---|---|
| December 31 — January 8 | January 22 to 29 |
| Booth C-58, Third Floor | Gallery 33 and 34 |
| Grand Central Palace | Coliseum |

THE BUDA CO., HARVEY, CHICAGO SUBURB ILL.
Address All Correspondence to
BRANDENBURG & COMPANY, Facty. Repr.
57th & Broadway, N. Y. 1112 S. Michigan Ave., Chicago 1811 Dime Bank Bldg., Detroit

## Cotta "Short Series" Transmission

Always-ready strength is the key note of commercial vehicle transmission requirements.

To meet this demand COTTA "SHORT SERIES" TRANSMISSIONS are built for most gruelling service throughout.

Model 10-C

COTTA "SHORT SERIES" TRANSMISSION is the "strongest transmission built." Its 3 speeds forward and 1 reverse are operated by heavy "dog clutches." Large area of working face assures lasting qualities.

*Insist on COTTA "SHORT SERIES" on your next truck*

Cotta Gear Co., 720-730 Sixth Street ROCKFORD, ILL.

## SOUTH BEND

## Double Duty Trucks

—once put in service—always remain in service.

Whatever your business may be there is a SOUTH BEND DOUBLE DUTY TRUCK that will give you the utmost efficiency and satisfaction.

***Wisconsin motors, Warner transmission, Sheldon axles, Ross steering gear, Bosch ignition. Either chain or worm drive.***

SOUTH BEND DOUBLE DUTY FIRE APPARATUS in all cases more than performs its duty.

Attractive Dealer Proposition. Write us at once.

**South Bend Motor Car Works**
**SOUTH BEND, IND.**



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# G. V. ELECTRIC TRUCKS

SIX MODELS: 1,000 POUNDS TO 5 TONS

Nearly 5,000 in use
Catalog on request

General Vehicle Company, Inc.
GENERAL OFFICES AND FACTORY
LONG ISLAND CITY, NEW YORK
NEW YORK :: CHICAGO :: BOSTON :: PHILADELPHIA

26-3

# "NORMA" BALL BEARINGS

(PATENTED)

Performance is the final measure of the value of a motor car or truck—standing out conspicuously long after all price considerations have been forgotten. And this performance is determined largely by the service quality of the electrical accessories—ignition apparatus, lighting generators and starting motors. A car or truck—as a satisfaction-giving, service-giving unit—is no better than its electrical accessories.

**The ignition apparatus, lighting generators and starting motors used on the best cars and trucks and adopted by the best car and truck builders, are equipped with "NORMA" Ball Bearings.**

*Are Your Electrical Accessories "NORMA"-Equipped?*

Send For The Catalog

THE NORMA COMPANY OF AMERICA
1790 BROADWAY NEW YORK
BALL, ROLLER, THRUST, COMBINATION BEARINGS

# Cullman Sprockets

For Diamond, Baldwin and Whitney Chains

## Differentials

Sprockets in stock and to order

Send for Catalog

Cullman Wheel Co.
1351 Greenwood Terrace
CHICAGO




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# QUALITY IN SPRINGS

No matter what expensive steels are purchased for spring making, the finished product cannot be right unless produced in a plant whose equipment is complete both for proper heat treatments and for efficiency records.

The Cleveland-Canton plant is large enough to care for an enormous production, and without slighting any step of the many processes that are carried out in the making of the famous Cleveland-Canton truck springs.

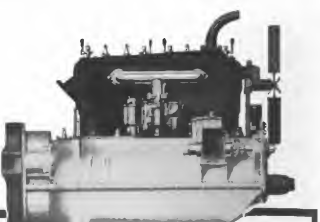
**THE CLEVELAND-CANTON SPRING COMPANY**
**CANTON, OHIO**

# The Wood Hydraulic Hoist

SOLVES THE DUMPING PROBLEM FOR MOTOR DUMP TRUCKS

"Made in Detroit Only" by the

**WOOD HYDRAULIC HOIST & BODY CO., Detroit, Mich.**
Successors to WOOD HYDRAULIC HOIST CO., St. Paul, Minn.



**A Real Long Stroke Truck Motor**

**Wisconsin**

CONSISTENT

Type TU — 4 in. bore, 6 in. stroke
Type UU — 4¼ in. bore, 6 in. stroke
Cylinders interchangeable.

Note these features.

CYLINDERS—Cast en bloc
CRANKSHAFT—Four bearing, chrome nickel steel, 2 in. diameter
VALVES—Rich Tungsten steel
CONNECTING RODS—BEARINGS—3 in. long, 2 in. diameter
BEARINGS—Bronze. Babbitt metal lined
CAMSHAFT—One piece, cams integral
OILING SYSTEM—Force-feed hollow crankshaft
3 POINT SUSPENSION.

Write today for detailed specifications and illustrations.

**WISCONSIN MOTOR MFG. CO.,** Sta A Dept 21D **MILWAUKEE, WIS., U. S. A.**



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**$1200**
**on easy payments**

# INDIANA

## Model S ¾ to 1-Ton

An absolutely reliable truck at a moderate cost. Small up-keep and excellent service under all conditions.

35 H. P. Rutenber motor, worm drive, insures the speed required for rapid and economical deliveries. Its sturdy yet flexible chassis gives it the strength to provide against overloads and any possible careless handling.

A wonderful vehicle for both user and dealer.

*Circular on request*

**Harwood-Barley Manufacturing Co.**
Marion, Indiana

# Baker
## Electric Trucks

**36 *more* Baker Electric Trucks to the American Express Company.**

*Three* large Express Companies are operating this winter over 300 Baker Trucks in principal cities of the United States.

Studying the problem of hauling merchandise efficiently has induced large corporations to buy electric trucks for city work.

Baker trucks are dependable, cheapest to maintain and depreciate slowly — not exceeding 10% per annum.

Baker trucks, 1, 2, 3½, 5-ton sizes are equally good for many small corporations having city trucking work. Our advice and catalog upon request.

THE BAKER R & L CO.
Cleveland, Ohio

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Equivalent of

# 1 to 3 tons "Dead Weight"

lifted off every truck by

# GOODRICH

"P.B."

(Permanent Band Type)

WIRELESS TRUCK TIRES

Goodrich "P.B." (Permanent Band Type) Truck Tires *reduce* the weight below springs from 100 to 300 pounds per truck—because all accessory metal tire fastenings, such as bolts, flanges, rims, etc., are eliminated.

Multiplying by 20, this (*in lessened wear and tear upon the mechanism*) is equal to a reduction in "dead weight" *above* the springs of from 2,000 to 6,000 pounds—or 1 to 3 tons *per truck*.

More miles and more speed from the same amount of power, lessened depreciation and fewer repairs, sum up the results.

***Write for folder giving full details.***

***The Goodrich "P.B." Tire has no peer.***

**Engineers say:** A reduction of **one pound** in weight of tires (or any part of a truck **below** the springs (is equal to **reduced strain** upon the mechanism to a **reduction of 20 lbs.** in weight **above** the springs. (Consult any engineer.)

**A stronger, lighter, better protected tire**

The elimination of accessory metal parts permits of a *heavier, stronger* base in Goodrich "P.B." Tires, which strengthens the whole tire and wheel—yet lessens the total weight per wheel.

The upturned sides of the steel base are distinctively *Goodrich* in design. They protect both tire and wheel from the effect of "side swiping" street car tracks, curbstones, etc. They are strong as pyramids and will not rupture. They are of proper height to fully guard the junctions of tread, hard rubber sub-base and steel base against separation as a result of side blows *yet not so high as to interfere with the full wearing down of the tough, resilient tread rubber.*

**The B. F. Goodrich Company**

Service Stations and Branches in All Principal Cities — World's Largest Rubber Factory, Akron, Ohio

# MACK TWO-TON DUMP TRUCK

**THE illustration shows a 2-ton MACK Worm Drive truck recently delivered to the West Laurel Hill Cemetery Company of Philadelphia.**

**The truck is equipped with a hydraulic power dump body and has an automatic tail gate. Body can be raised and lowered while the truck is in motion, and when elevated to a 30° angle there is a space of 30" between the lower corner of the body and the ground, giving ample clearance for stacking material on load already dumped.**

**This truck has a 26 horsepower MACK motor, unit power plant.**

| | |
|---|---|
| Motor Running | 1,000 R. P. M. |
| Maximum Dumping Angle | 50 Degrees |
| Time required to raise body to maximum angle | 20 Seconds |
| Time required to lower body from maximum angle | 40 Seconds |

**Regular MACK equipment provides our standard steel cab with curved top, and cowl dash with sliding doors.**

**WRITE FOR FURTHER DETAILS**

**Our complete line—1, 1½, 2, 3, 4, 5, 6½, 7½ tons. Tractor Trailers 5 to 15 tons.**

INTERNATIONAL MOTOR COMPANY

West End Ave. & 64th St. New York

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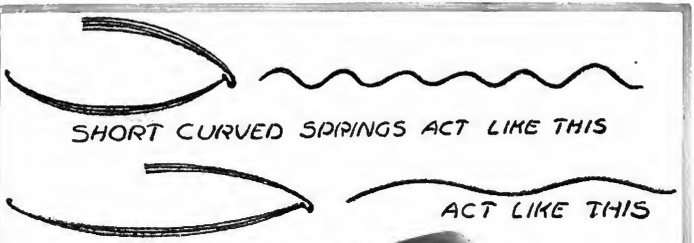


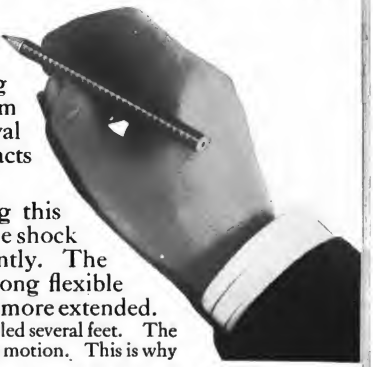

AN automobile spring absorbs the shock from the road and a brief interval elapses before the spring acts on the body of the car.

In a short curved spring this interval is very slight. The shock is transmitted almost instantly. The result is a jolt. With a long flexible spring the interval is much more extended. In the meantime the car has traveled several feet. The result is an undulating, wave-like motion. This is why

# DETROIT SPRINGS

give comfort and easy riding and protect the car.

Detroit Spring engineers co-operate with car designers to make the springs as long and flat as the car will permit.

**The Lubricating Cups Identify Detroit Springs**

Our booklet "From the Ore to the Motor Car" tells about some other manufacturing details that enter into spring service. Send for it.

RESILIENT Detroit Springs TRADE MARK SILENT SELF-LUBRICATING

**DETROIT STEEL PRODUCTS COMPANY**
2260 East Grand Boulevard
Detroit, Mich.




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# The U. S. Army buys Trucks equipped with the

**M&S DIFFERENTIAL**

## Soon ALL Truck buyers will demand it

The M & S Differential for Commercial Vehicles gives all the advantages of a differential lock, yet automatically allows for differentiation of wheel travel in turning corners.

### Pulls Both Wheels

The action of the spiral gears in the M & S is such that power is evenly distributed to **both** rear wheels when tractive resistance is equal. When one wheel loses traction in mud, deep sand or on slippery pavements, the power **goes to the wheel having the GREATEST TRACTION** instead of the one having the least, as is the case with the present bevel gear differential.

### Made by the World's Greatest Differential Factory

The American manufacturing rights for the M & S Differential have been secured by Brown-Lipe-Chapin Co., of Syracuse, a guarantee in itself of quality and an assurance that the M & S will "stand up."

### Standard Equipment in the Celfor Internal Gear Axle

The Celfor Tool Co., of Buchanan Mich., can now supply M & S equipped internal gear axles.

*U. S. Patents 1036042 Patents in foreign countries. All infringements will be prosecuted.*

### Get ALL Your Power

Greater efficiency is possible with the M & S because you get all the power all the time. Rear wheels **can't** spin, so tires wear longer. You use less gasoline because you always have a steady pull. The danger of skidding is lessened because wheel spinning is impossible and if one wheel has any traction at all, that wheel will hold the road.

### Here's What "Jeffery" says:

During all our tests M & S differential never failed to work entirely satisfactory. We find that anti-skid devices are unnecessary when cars are equipped with your differential, which in itself is sufficient to warrant its use on a car and will be quickly appreciated by the public once it is demonstrated. Furthermore, the feature that the power is applied to both wheels at all times will take the car through roads that it would be impossible to pass through with an ordinary differential.

We are very much pleased that we were of the first to whom this new invention was submitted.

THE THOMAS B. JEFFERY CO.

**For sample M & S Differential built to fit your axle, write to Brown-Lipe-Chapin Co., Syracuse, or to**

**The M & S Gear Co., 1036-42 David Whitney Bldg., Detroit, Mich.**




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The Krebs

# IN A NUTSHELL

**The Company**

The KREBS COMMERCIAL CAR COMPANY are experts. They have been building cars and trucks since 1899. Experience that has led to excellence.

**The Truck**

A clean, trim, sturdy chassis. Handsome Renault type radiator. Continental Motor with KREBS Automatic Governor (see below). Timken - Brown Worm Drive. Left Drive, Center Control. Exceptional carrying capacity.

## The Governor

This is the special KREBS feature. The owner controls the truck through the Governor. Set the Governor to any speed from 5 to 20 miles and from the time it leaves the barn it is under automatic control. Under all conditions it will keep an even speed. "The driver steers!"

**Can you afford to overlook this wonderful truck?**

*Made in models of 3-4, 1, 2 and 3-tons with bodies to suit all trades.*

DEALERS: Write for our proposition.

KREBS COMMERCIAL CAR COMPANY
CLYDE, OHIO, U. S. A.




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COVERT

TRANSMISSIONS

The name COVERT is an assurance of service and satisfaction. It stands for quality. It represents efficiency. It signifies simplicity of construction. It assures durability. It indicates the greatest transmission value. It means economy in assembling and of operation. It's the name that will help sell your product.

We make transmissions for all types of pleasure cars and trucks. Consult our engineers concerning your requirements.

COVERT MOTOR VEHICLE COMPANY
FACTORY, LOCKPORT, N.Y. SALES OFFICE, DETROIT, MICH.



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# The New Dreadnaught Of Truckdom

## Read These Specifications

**Motor** — Buda 4½x5½ — equipped with Bosch high-tension magneto and Stromberg carburetor. Cooled by centrifugal pump and fan.

**Clutch and Transmission** — Sixteen-face multiple disk clutch. Ball-bearing transmission—four forward and one reverse. All gears are heat treated and especially designed for extra heavy duty. Drive is through two piece tubular shaft with three universal joints.

**Axles** — Front — drop-forged I-beam type. Rear, internal gear drive type. Steel I-beam carries load. Power transmitted through live shafts and pinions which connect with large internal gears bolted to road wheels. Brakes oversized internal expanding and external contracting.

**Springs**—Extra strong and long, heat treated, oil tempered.

**Wheels and Tires** — Wood and steel wheels optional. Wood wheels have fourteen spokes, rear 3½ inches square, front 2¾ inches square. Tires Firestone, rear 37x5 (dual), front 37x5 (single).

**Steering Gear**—On left side. Center control.

**Wheelbase**—165 inches. Dimensions back of driver's seat 37 inches by 146 inches. 185-inch wheelbase $50 net extra.

**Equipment** — Oil lamps side and rear, horn, tool kit, tool box.

Phantom Showing Three-Ton Republic's Internal Gear Drive, at Road Wheels

# Republic Three Ton

THE purchaser of a heavy duty truck demands *definite assurance* of durability—sturdiness equal to every load—a truck on the job every day.

He demands accessibility and ease of operation—economy in tire expense—economy in fuel expense. And he is more and more demanding that maximum motor energy which the Republic internal gear secures. What more definite assurance can be given than the

## Republic's Roll of Honor

—the features that are enrolled in the Republic's specifications: Powerful Buda motor, internal gear drive, liberal use of nickel steel, oversize parts, such accessories as Bosch magneto, Stromberg carburetor, Firestone tires.

The Republic line includes models F, ¾-ton with express body, $995; E, 1-ton chassis, $1275; A, 2-ton chassis, $1575; T, 3-ton chassis, $2350.

Republic Trucks, low priced as they are, are not sold on their prices. We invite comparison on construction alone.

Investigate the service which Republic Heavy Duty Trucks are giving in trucking centers everywhere. You will find these trucks in practically every line in the exclusive company of the *proved* trucks of America. Write for special folder on Republic Model T, three-ton, and the name of the Republic dealer nearest you.

**Dealers** A few choice territories are open. Write or wire for our proposition.

**Address Department N**

REPUBLIC FOR SERVICE

REPUBLIC MOTOR TRUCK CO.

ALMA, MICH.



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## Four-Wheel Drive Specifications

Wheelbase—3 ton, 122 inches; 6-ton, 140 inches.

Steering—Motor power (operated by hand lever) on all wheels giving positive action to a powerful, sure, foul-proof steering device which makes a remarkably short-turning radius.

Axles—Special patented full floating. Bearings—Rhineland.

Motor—3 tons, 4¼ x 6¼ Waukesha. 5½ x 7 Morton.

Transmission — Morton Selective 4 speeds forward, 1 reverse. Double worm drive to all wheels.

## Morton Worm Drive Specifications

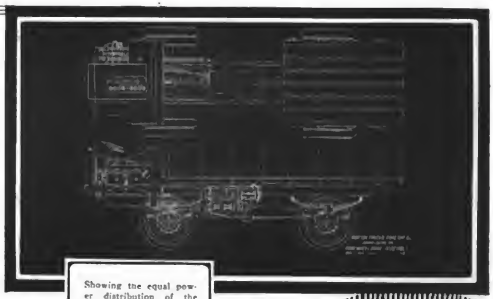
Motor—Continental—4 cyl.—4 cycle.

Carburetor—Carter.

Ignition—Bosch.

Lubrication — Positive plunger pump with constant level.

Centrifugal water pump. Hele-Shaw clutch. Selective transmission. Lever control. Right hand drive. Solid forged axles. Worm-Wheel of special phosphor bronze. All other equipment equally reliable.



Showing the equal power distribution of the Morton Four-Wheel Drive assembly

# MORTON

Four-Wheel Drive equally distributes the propelling strain over the four axles giving the highest efficiency because every pound of energy is turned into a distributed tractive effort. Morton Four-Wheel Drive Trucks in 3 to 6 ton capacity, are built to withstand the hardest usage and to mount the heaviest grades.

**Morton Worm Drive Trucks**

**1½—2—2½—3½—5 Tons**

Are the perfect vehicles of the light truck field.

## Extra Money For You

Aside from the regular truck business you can increase your earnings and the efficiency of your local fire department by interesting town officials in the finest combination hose and chemical wagon ever built.

Designed by capable engineers who provided every conceivable means for making this a dependable fire fighting unit that will get to a fire, regardless of the road it has to travel. The Morton Hose and Chemical Wagon is built of the best material, by the most skilled mechanics obtainable.

Electric starting, lighting and ignition systems are installed in such manner as to make failure to operate an impossibility. Simplicity is the keynote throughout.

Motor—Continental—6 cylinder four cycle, water cooled, 4⅛ x 5¼—60 H. P. of the unit power plant type. Starting and Lighting—Jesco Combined Starting and Lighting Systems. Carburetor—Carter. Drive—Worm Gear. Brakes—service and emergency on rear wheels. Steering Gear—Irreversible type.

Guaranteed against defective workmanship or material for one year.

Equipment—2 35-gal. chemical tanks connected with by-pass. 200 ft. of ¾-in. chemical hose. 1 extension truss ladder, 1 solid side roof ladder, 2 axes, 2 bars, 8-ft. pole, 2 3-gal. hand extinguishers, acid receptacle, plug for nozzle and all tools for operating tanks and devices.

Morton Truck and Tractor Company's combination hose and chemical wagon

*Dealers—Communicate for Open Territory*

**Morton Truck & Tractor Company**

Harrisburg Pennsylvania



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# SKF BALL BEARINGS

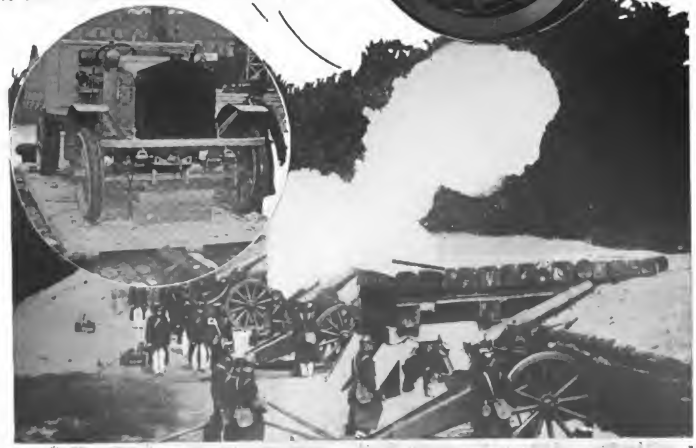
## Doing Their Share and Doing It Well

In the motor transport service of the armies of Europe, S. K. F. Ball Bearings are doing their full duty. Thousands of the heaviest and most powerful motor-lorries and other vehicles are giving the best service—under the most trying conditions are equipped with S. K. F. Ball Bearings.

Accurate, lasting and efficient S. K. F. Ball Bearings insure security on the Double Row of Swedish Crucible steel balls and races. S. K. F. Ball Bearings are used because they are a triumph for good design, perfect materials, and the highest type of manufacturing skill and accurate workmanship throughout.

**SKF BALL BEARING CO.**

50 Church Street New York City



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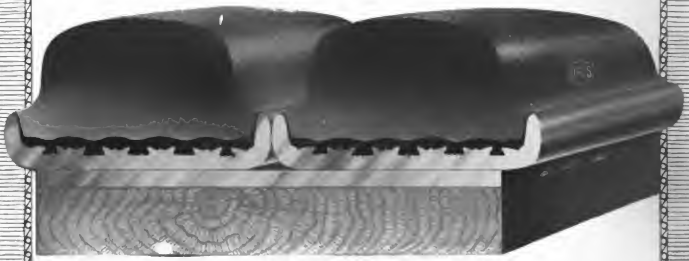
*The New*

# UNITED STATES TRUCK TIRE

**The improved design of The United States Pressed-On Truck Tire controls the displacement of rubber under the load so that the original shape of the tire is maintained until the tire is worn out. This tire is vulcanized under 800 tons pressure by the only press of its kind in the United States.**



The United States Truck Tire contains many mileage-increasing improvements. One of the most important of these is—

## An Improved Design

The design of the United States Pressed-On Truck Tire shows a marked improvement. The shape of the tire controls the displacement of the rubber under the load in a peculiarly efficient manner. The tire, for its entire life, retains its original shape irrespective of the weight of the load it bears. This absolutely prevents any side stripping of the tread rubber.

In addition to the new advanced design, the new tire contains other vital improvements. Some of them have been described in previous advertisements, and others will be explained in the near future.

## United States Tire Company

**Broadway at 58th Street** **New York City**

**Branches in all principal cities give prompt, liberal, courteous service**

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B. A. GRAMM
Originator of Gramm-Bernstein Trucks

# Build Your Truck Business On The Best Known Name

THERE are prospects for Gramm-Bernstein Motor Trucks in every community. Fifteen years of truck building success, and Gramm-Bernstein Trucks in every part of the world, attest the efficiency, dependability and economy of this famous line. Dealers who ally themselves with the Gramm-Bernstein Company have a prestige and market not matched by any other proposition.

# GRAMM-BERNSTEIN MOTOR TRUCKS

In one-ton to six-ton sizes provide a truck for every demand—from retail delivery to the heaviest engineering work—the finest construction possible to truck building science, at prices which interest all purchasers.

Get the facts about the distinctive Gramm-Bernstein features. The trouble-proof transmission—found only in the Gramm-Bernstein truck—gears always in mesh—stripping impossible.

Worm drive—power and strength for great overload—simple and sure control—dry disk clutch—specially strong spring mounting—advance construction throughout

MANUFACTURED EXCLUSIVELY BY
THE GRAMM-BERNSTEIN CO., LIMA, OHIO, U. S. A.

*In territory not closed, truck dealers and prospective dealers are invited to write for our liberal proposition*

SIZES AND PRICES
(Chassis only, painted to order)

| | |
|---|---|
| 1-ton | $1500 |
| 1½-ton | $1800 |
| 2½-ton | $2600 |
| 3½-ton | $3400 |
| 5-6-ton | $4300 |

F. O. B. LIMA
We build all kinds of bodies as ordered

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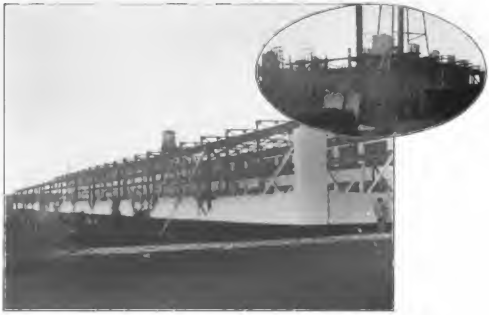
# 1916 Will Be "Another FEDERAL" Year



Part of the Additions Being Made to the Federal Factory

"Business is Booming" has always been a reality for Federal Dealers.

But 1915 has been THE FEDERAL YEAR!

The worm drive model FEDERALS, 1½, x and 3½ tons capacity, have met with remarkable success everywhere.

Federal dealers have made such big gains in sales that our output was more than doubled.

AND FEDERAL DEALERS WERE GIVEN THE PREFERENCE ON DELIVERIES RATHER THAN FOREIGN WARRING NATIONS. AMERICA FIRST IS OUR POLICY!

The most constructive co-operation was given to our dealers by the Federal organization, on Sales, Advertising, Service, and other problems in which our experience enables us to aid our dealers

## 1916 WILL BE A STILL BIGGER YEAR for FEDERAL Dealers

New factories under construction will double the output of 1915.

Where success based on quality, experience, and honorable dealings abounds, your assurance of success is greatest. All Federal dealers are making money—so is the Company—and the trucks themselves are the greatest successes in the field.

Join this success to your own ability and experience as a dealer.

The first step is to—

*Write us for Federalized territory*

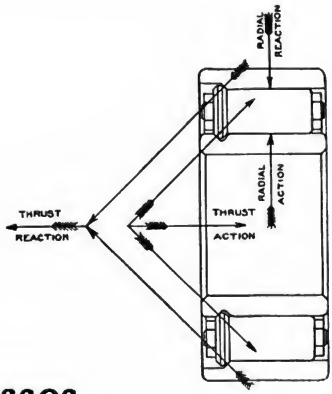
## Federal Motor Truck Company

**122-130 Leavitt Street** **Detroit, Michigan**



Digitized by Google

**One Bower Bearing cannot differ from another by 1/160 the thickness of the white line in the border**




# Stresses

The various stresses to which any bearing is subjected are all carried, in Bower Roller Bearings, in the most efficient manner. For

1. Every stress is carried by a **surface.**
2. Every stress meets its bearing surface at a **right angle.**

No other bearings combine these features.

# Bower

**Roller Bearing Co.**

**Detroit - - - - - Mich.**

Digitized by Google

## A Firestone Factor of Efficient Truck Tire Service

which has proved its success wherever trucks are operated is the S.A.E. Removable Rim Equipment. Years of the hardest use in many varied lines have established the Firestone as standard equipment, always dependable.

With this equipment any driver can change tires in a few minutes, without removing the wheel from the truck. It makes a great addition to the actual running time of truck service.

Fifteen years of tire development by the most highly specialized experts ever assembled in one institution, have wrought the Firestone "Most Miles per Dollar" design and quality—toughness that gives longest wear combined with resiliency that protects the truck mechanism. This accounts for the fact that by far more Firestone Truck tires are in use than of any other one make.

There is a Firestone Tire for every demand and a Firestone Service Station in every trucking center with specialists to give you the benefit of their experience and counsel. Call the Firestone headquarters nearest you for details and low prices.

**Firestone Tire and Rubber Co., Akron, Ohio—Branches and Dealers Everywhere**

*"America's Largest Exclusive Tire and Rim Makers"*

# Firestone TRUCK TIRES

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# POWER PLUS

Duplex Front Axle showing details of power-transmission

The DUPLEX 4-Wheel Drive Truck represents the realization of an ideal. That ideal is to make a motor truck so strong and yet so flexible that no condition of carrying or hauling would be too great for it.

That is just what has been materialized in the

## DUPLEX 4 WHEEL DRIVE TRUCKS

Duplex Wheel — Note heavy, sturdy construction. All wheels interchangeable

Men whose business brings them up against the BIG problems in trucking are enthusiastic over DUPLEX performance.

As one of these said, "that truck will go anywhere."

The power is transmitted powerfully and evenly to each of the four wheels. Mud, snow, sand or gravel have no terrors for this form of drive.

The United States Government has recently placed their third order for DUPLEX 4-Wheel Drive Trucks for military purposes. The first order, of course, was only after exhaustive tests. The repeat orders speak for themselves.

DUPLEX 4-Wheel Drive Trucks are fully covered by patents and are made in 2- and 3-ton capacity.

DEALERS: Write for full information about this wonderful truck.

**THE DUPLEX-POWER CAR COMPANY**

*Manufacturers of Four Wheel Drive Trucks*

CHARLOTTE MICHIGAN

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# FULLER
## Truck Transmissions

**The highest grade Transmission used by the best Truck builders**

**A new reinforced concrete addition now building will double our plant.**

TU—¾-1 TON TU2—1½-2 TON

***Write for complete data Catalog No. 24***

**Fuller & Sons Manufacturing Co.**
**Kalamazoo, Mich.**




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# Gold Medal Mileage Recorders

## Highest Award and Gold Medal at Panama-Exposition

## DREADNOUGHT

*Hub Odometer*

Built for practical men by practical men who know the working conditions of truck operation. Built to get accurate mileage records.

*Guaranteed Indestructible*

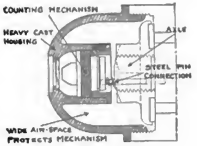
The heavy cast housing prevents injury to mechanism from collision. No money lost on smashed instruments.

*Grease-and Dirt-Proof*

Special construction prevents oil or grease leaking from axle on to inside of glass window. Figures are always clearly legible.

*Easy to Read*

Figures remain stationary and upright — always easy to read. No danger of error.




*Send for booklet*

## RECORDOGRAF

*Tape Recorder*

You can save money in truck operation by keeping mileage records. Recordograf gives you a permanent record of the entire day's operation. It registers on a tape:

1. *Time truck is moving*
2. *Time truck is still*
3. *Distance Covered*
4. *Speed at various times*

It shows where the delays are and how long. It registers every stop. With the Recordograf you can compile data of every description, such as cost of deliveries, efficiency of truck and driver, etc. This will enable you to stop the leaks and materially cut down the cost of your truck operation.

Let us show you what the Recordograf is doing for some of our customers.

## American Taximeter Company

**1765 Broadway** **New York**

### Service Stations Everywhere

*See our exhibit at the New York Show—Space D 182 and at Chicago Show—182 and 183, Annex, 2nd floor*



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# Velie

## Compare Velie Values In Truck Construction

VELIE Truck factory is now concentrated on two models that are proving unusual capacity, power, strength and economy in the hardest service to which trucks were ever submitted. In these extreme tests Velie Trucks have gained a signal leadership. Comparison of Velie Values at once discloses the reasons. Write for details. The two trucks now engaging the full facilities of our big truck plant are:

**Model 25, 1½-2-Ton Capacity $2250**
**Model 26, 3½-Ton Capacity $3350**

Velie construction is featured in both models by Worm Gear Drive—Heavy Duty Continental Motors (4⅛x5¼ in Model 25 and 4½x5½ in Model 26), Velie-Stewart Vacuum Feed—Tubular Radiator—Four Forward Speeds, with direct drive on fourth—Steel Raybestos disc clutches, extra depth of frames—Driver's seat and cab included with chassis—Gas Head-lights, and Prest-O-Lite tank besides the regular oil lighting equipment.
The United States government uses Velie Trucks. Government experts, after an extended examination, approved Velie construction. Keep in touch with Velie Truck news for information that means profitable business for dealers in every community.

**Velie Motor Vehicle Co., 121 Velie Place, Moline, Ill.**

WORM GEAR DRIVE
# Trucks




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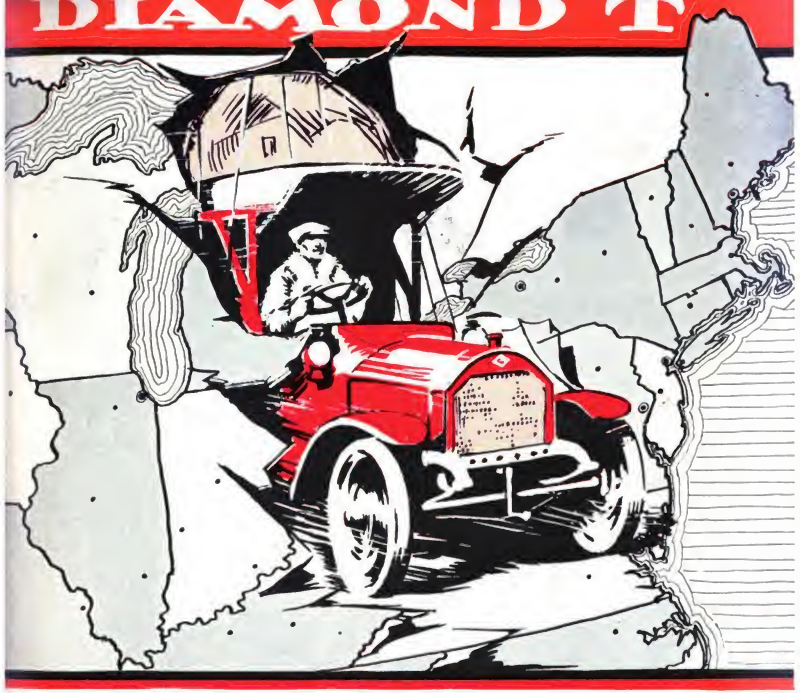


Here are the principal specifications of DIAMOND T TRUCKS. Each and all of these units are built into each and every model in the Line in such a way that the most critical inspection can find nothing to criticise. Each unit of the assembly not only is hooked up so as to perform its particular function most efficiently but to do so in perfect coordination with the others.

# SPECIFICATIONS

## ¾-ton—1-ton—1½-ton—2-ton—3½-ton

Continental Motors
Rayfield Carburetors
Brown-Lipe Transmission
Timken Front Axle
Gemmer Steering Gears

A. O. Smith Frames
Bosch Ignition
Spicer Universal Joints
Brown-Lipe Clutch

Timken-Detroit Rear Axle
Timken-David Brown Worm Gear
Mather Springs
Schwarz Wheels

Your investigation will bear out every claim we have made for scientific engineering and dependable construction and like that of thousands of business men, your selection of DIAMOND T equipment will mark the beginning of years of economical, successful and satisfactory truck service.

Digitized by Google

# Eastern Headquarters

## Truck Users

The organization of the DIAMOND T TRUCK COMPANY of New York and the establishment of its headquarters at 245 West 55th Street, New York City, practically duplicates the service facilities of the parent organization in the east.

This organization is composed of men whose truck knowledge and skill in the solution of transportation problems is founded on an experience dating back to the early days of truck usage.

This organization will operate according to the policy, the soundness of which has been proven by the success of the parent company—that of extending every cooperation to insure the most practical and economical results from the use of DIAMOND T TRUCKS—and in line with this policy a complete stock of replacement parts and facilities for the repair of DIAMOND T TRUCKS will be maintained in New York so that DIAMOND T TRUCK users in the east will be afforded the same prompt and efficient service as DIAMOND T users in Chicago.

If you are located in the territory outlined here, we request that you make your inquiries direct with the DIAMOND T MOTOR TRUCK COMPANY of New York.

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# for Diamond T Trucks

## To Truck Dealers and Exporters

In taking over the distribution of Diamond T Trucks in the territory mapped out in the illustration the Diamond T Truck Company of New York not only are in position to make you the same proposition as the home office but give you the further advantage of a source of supplies—parts and service within quick access.

The New York Organization is to all intents and purposes a factory branch—a duplicate in the east of our factory sales and service facilities.

All inquiries and correspondence regarding dealer propositions—parts and service in the Eastern Territory as well also for export—should be addressed to

**Diamond**
**T Motor Truck Company**
OF NEW YORK
**245 West 55th Street, New York City**

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# Diamond T Trucks

The wisdom of maintaining the specifications of DIAMOND T TRUCKS so that no single truck nor any line of trucks can evidence a single point of superiority has been an all-powerful factor in focusing the attention of truck users on DIAMOND T TRUCKS.

The fact that DIAMOND T TRUCKS—singly or in fleets—are used in practically every line of trade—the further fact that initial purchases invariably have been followed up by repeat orders—and the growing demand for DIAMOND T TRUCKS by big representative business establishments—proves beyond question that DIAMOND T design and construction are both scientifically correct and dependable—worthy of the parts incorporated in the assembly.

The quality of their specifications—the correctness of the design and the dependability of their performance are the three factors which make up the basis of our solicitation of your investigation of DIAMOND T TRUCKS whether your interest is that of user or dealer.

**Diamond T Motor Car Company**
CHICAGO, ILL.

**Diamond T Motor Truck Company**
OF NEW YORK
245 W. 55th St., New York City

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**The dealer in motor trucks who realizes that competition in this line is getting keener every day is the one that we want to talk to. He is the one to whom the COMMERCE Line of 1500-lb. Delivery Trucks is going to appeal.**

Commerce

*1500 Lbs. Capacity*

***Models*** **chassis complete**

**$875.00**

**F. O. B. Detroit**

NC—Body designed for grocery, department stores, etc. $975.00 F. O. B. Detroit.

NH—With standing top and waterproof curtains. $975.00 F. O. B. Detroit.

NA—Open express type (as shown above). $975.00 F. O. B. Detroit.

Here is a line of trucks built for one special purpose, the field for which is constant and profitable.

The selling points of the COMMERCE Line are such as will recommend the trucks immediately.

***Note this summary of specifications—***

**Capacity—1500 lbs.**
**Wheelbase—120 in.**
**Chassis weight—2200 lbs.**
**Speed maximum—25 miles per hour.**
**Continental Motor**
**Waterproof Eisemann Magneto**
**Unit Power Plant**
**Finned Cast Tank Radiator**
**Loading space seven feet**
**Choice 3 Types Bodies**

***Dealers—Write us. Your field may be open!***

**Visitors to the New York Show—See the Commerce at our New York Agency 2002 Broadway**

# Commerce Motor Car Company

**Detroit, Michigan, U. S. A.**



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# BESSEMER TR

*The appointment of the*

## Bessemer Motor Truck Corporation

FRED T. NESBIT, President

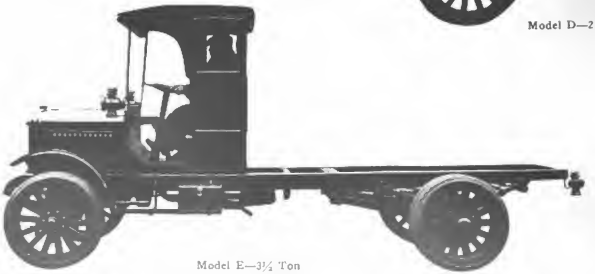
Long Beach Bldg., Lexington Ave. & E. 42nd St., (2 blocks from the Grand Central Palace)
NEW YORK

## (DISTRIBUTORS)

affords a most convenient opportunity for the inspection of BESSEMER Trucks during Automobile Show week, Dec. 31st to Jan. 8th.

We extend a cordial invitation to all who are interested in the use or sale of motor trucks to call and investigate the line.

Model D—2 Ton



Model E—3½ Ton



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# UCKS

Model G—1 Ton

## DEALERS

All negotiations with regard to the sale of BESSEMER Trucks in New England, Eastern New York, Eastern Pennsylvania, New Jersey, Delaware, Maryland, Virginia and the District of Columbia should be taken up with the BESSEMER MOTOR TRUCK CORPORATION.

## THE LINE

**Model "G" 1-ton Internal Gear Drive Truck, $ 975.**
**Model "D" 2 " Worm Drive . . . . 2000.**
**Model "E" 3½" Worm Drive . . . . 2800.**

# Bessemer Motor Truck Company

## Grove City, Pa.



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# INCREASED
# EXAMPLE O

SHOWN herewith is the new home of Fedders radiators. This plant which has just been occupied provides for a little more than double the capacity of the old plant. The new portion is the four story structure shown in the illustration above.

¶ Notwithstanding the fact that even with this vastly increased manufacturing facility we are unable to accept all of the orders offered us at this time, we feel that with this new factory we have the finest equipment for the production of quality radiators in existence. At least under normal conditions it should enable us to maintain our reputation for both quality and service—a reputation attested to by scores of America's leading manufacturers, many of whom have used Fedders radiators since first they were produced.



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# FACILITIES ANOTHER FEDDERS SERVICE

FEDDERS RADIATORS

THE illustrations below show graphically one of the reasons for Fedders quality. Primarily of course quality is dependent upon design and materials. But given those in the production of radiators and quite another factor enters that is of equal importance—that of most extreme testing and inspecting, to insure against leaks.

¶ The photograph at the left shows one of the testing rooms with its long rows of testing tanks. In this room the cores are tested, during the process of assembly, under pressure, to make sure that every joint is solidly soldered. Some idea of the capacity of the Fedders plant may be gained by noting the size of this testing room.

¶ The photograph at the right shows the final check against faulty or leaky radiators. It is one corner of the final testing room into which every completed radiator comes just before being packed for shipment. After the radiator has passed through every other test and has been finally assembled and made ready for installation upon its chassis, then as a positive check upon all other departments it is sent to this final testing department where it receives its release to the purchaser.

*One of the testing rooms with its long rows of testing tanks. In this room the cores are tested, during the process of assembly, under pressure, to make sure that every joint is solidly soldered.*

*One corner of the final testing room into which every completed radiator comes just before being packed for shipment*

FEDDERS MFG. CO. Buffalo, New York



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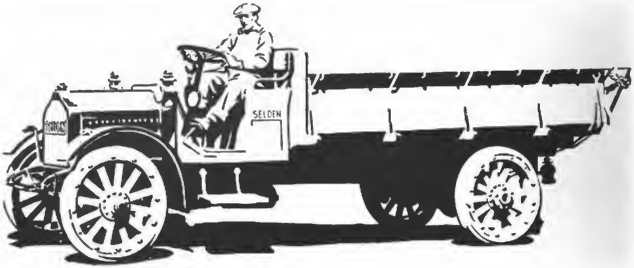


# SELDEN TRUCKS
## *for* 1916

*FOUR NEW MODELS*

| | |
|---|---|
| 1¼ Ton Worm Drive | 2 Ton Internal Gear Drive |
| 2 Ton Worm Drive | 3½ Ton Worm Drive |

The best selling line ever offered to live dealers and discriminating buyers.

We finance our dealers when necessary and assist them in making sales and profits.

Responsible and representative dealers wanted in all open territory.

Catalogs and full information furnished upon application.

**Selden Truck Sales Company**
**Rochester, New York**



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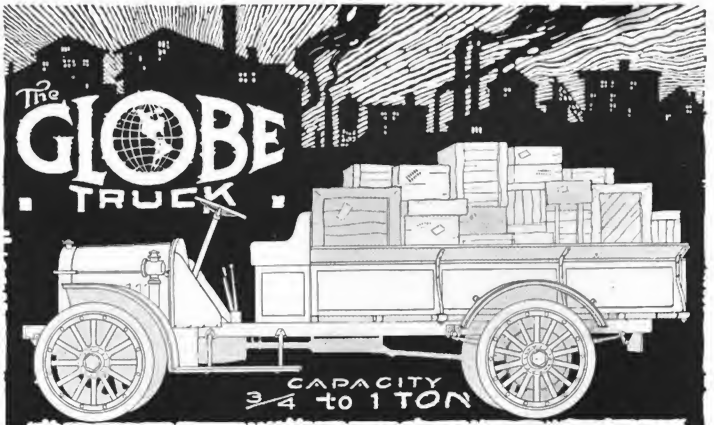


# SIX CYLINDER MOTOR

PRICE

# $1085.

SPECIFICATIONS

6 Cyl. Continental Motor.
Dixie Magneto.
Schebler Carburetor.
Internal Gear Rear Axle.
Sheldon Front Axle.

SPECIFICATIONS

"Long" built-up Radiator
Circulating Water Pump.
Complete with Tools.
F. O. B. Northville or Detroit.

# THE TRUCK AHEAD

**DELIVERIES** are considered a part of the contract with all agents and users by the manufacturers of this truck. They are amply able to care for customers. Ask for booklet "G."

**DESIGN** in the Globe Truck combines the best features that truck engineering has developed. Its parts include the best of those proven successful in every field of use. Its flexible, vibrationless six cylinder motor doubles its life and quadruples its usefulness. Ask for descriptive booklet "L."

**CO-OPERATIVE SERVICE** includes continuous advice and assistance from the manufacturer to the user, beginning with a compilation of cost data affecting his particular field and including periodic advice through years of service of every phase of increasing a truck's usefulness. Ask for service plan "O."

**CO-OPERATIVE SALES** include continuous bi-weekly sales campaigns covering every line of business. Ask for sales circular "B."

**THIS OPPORTUNITY** is not being offered to your competitor—it is being offered to YOU. Are you ready? Are you the one who can see into the future? Are you with us? visit us, wire or write today for the Globe exclusive agency contract and the dealer's special sales campaign appropriation.

*Mark Your Reply*
*"Proposition E"*

*Globe Truck Dept.*
**THE GLOBE FURNITURE COMPANY**
**Northville, Mich.**



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# HERE IS A STATEMENT O

**In writing a prospective truck purchaser, The Southern Pine Lumber Co., of Texarkana, Ark., which operates three Wichita Trucks. says in part:**

> "If any other machine could do better than those we have, we do not know in what particular, because they carry the load, and the maintenance cost is very light.....Of course deep sand or mud either, is bad for any motor vehicle, but the first one we bought has been run in sand almost continuously with good results. The machine will pull as long as the axle is above ground."

It is not our desire to monopolize the good performance of Wichita Trucks by intimating that their good performance is due solely to the fact that they are equipped with Sheldon Axles.

What we do wish to emphasize, however, is the fact that Sheldon Axles do play an important part in the performance of any truck upon which they are installed. And the fact that this practical user finds that these trucks carry

SHE

## The Sheldon Axle

*Makers of Springs and Axle*

**Wilkes-Barre**

Chicago: 122 S. Mich. Blvd. Detroit 1215



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# F FACTS, NOT THEORIES

the load with a light maintenance cost simply bears out the arguments we have propounded for years as to the general all-around efficiency of the worm type of drive as exemplified in Sheldon Practice.

It is the axle that has most to do with the ultimate delivery of the motor power to road wheel contact; and the fact that Sheldon Axles under actual test deliver from 95 to 97% of the power applied at road wheel contact is unquestionably an important factor in the satisfaction the Southern Pine Lumber Co. derives from the use of Wichita trucks.

That Sheldon Axles do stand up well and deliver the maximum of power is attributable primarily to their general design:

First: In that the worm loads both thrust and radial are carried on ball bearings——

Secondly: That Sheldon Worm Gear Axles are built on the semi-floating type of construction——

Thirdly: In that the driving strain is taken through the springs (which in this instance are also of Sheldon make)——

Fourthly: That the braking strain is taken by the rear wheels instead of on the propeller shaft.

DON

d Spring Company

ore Than 50 Years

Pennsylvania

ward Ave., San Francisco: 444 Market St.

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GMC
GENERAL MOTORS COMPANY
TRUCKS

EFFICIENCY

# 148% Increased Production

We are pioneer truck builders. We have never built anything but motor trucks. We have had big years. But this year our production is 148% greater than last year, and we haven't booked a single war order.

Business houses large and small have bought GMC Trucks—for use in cities and in rural districts—for all kinds of different work.

The obvious advantages of motor trucking are daily increasing the use of high grade trucks. And we are the only company building a complete line of both gasoline and electric trucks—worm drive, chain drive, shaft drive—from 1000 pounds to six tons. Ours is the largest exclusive truck factory in the world, and we turn out nothing but high grade commercial vehicles.

So come with confidence to *"truck headquarters"* for a truck to fit your needs.

GENERAL MOTORS TRUCK COMPANY

*One of the Units of General Motors Company*

PONTIAC, MICH.

*Direct Factory Branches: New York, Boston, Chicago, Philadelphia, St. Louis, Kansas City*

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ACME
THE TRUCK OF PROVED UNITS

# DEALERS—Write or Wire

Secure the early 1916 orders to be placed immediately by business firms in your territory for ACME 2-Ton Trucks.

The ACME has greater truck dimensions on 148-inch wheelbase—more power—larger guaranteed overload capacity under normal conditions—extra spacious appearance—well balanced and artistic design—and fourteen proved units harmoniously combined, backed by leading American manufacturers.

| | | |
|---|---|---|
| Continental Motor | Timken Bearings | Long Radiator |
| Timken Worm Drive | Warner Clutch | Eisemann Magneto |
| Timken Front Axle | Warner Transmission | Rayfield Carburetor |
| Timken Rear Axle | Detroit Springs | Gemmer Steering Gear |

Smith Pressed Steel Frame Pierce Governor

In the ACME buyers get the benefit of the experience of thousands of truck users—save all experiment.

From starting crank to tail light there is not an experimental feature in the ACME—nothing but proved units.

*Obtain the immediate January and February orders*

## Clinch the Agency—GET IMMEDIATE TRUCK BUSINESS!

Make the biggest, best class of truck buyers your boosters.
Our territorial proposition lays solid basis for permanent profitable connection with this strong financial organization.

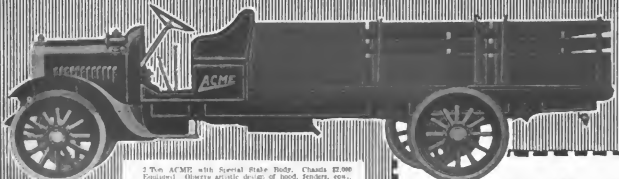
*New ¾-Ton Truck*
*For Spring Delivery*
*Watch for Announcement*

Act quickly to get this early 1916 business in next 30 to 40 days. Send Coupon for Agency Terms and Agreement—OR WIRE.

## Cadillac Auto Truck Co.

**11 Mitchell Street**

**Cadillac Michigan**




2-Ton ACME with Special Stake Body. Chassis $2,000 Equipped. Observe artistic design of hood, fenders, cowl, seat, frame, etc. Has 40 H. P. Continental Motor—Jipsted suspension unit power plant—oversize gears and general dimensions above standard.

MAIL THIS COUPON
CADILLAC AUTO TRUCK CO.,
11 Mitchell Street, Cadillac Michigan
Please send all the facts about the ACME 2-Ton Truck and your Agency offer for your territory.
Firm Name .....
Individual .....
Address .....
Present Agent for .....



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*Fractured gears showing case hardening results. Lower piece faulty—no case hardening. Upper piece good. Note hard strip around edges of fracture at right of good gear.*

# BROWN-LIPE ACCURACY

ACCURACY—in Brown-Lipe practice—is in no wise limited to the machining operations and their inspection.

It is just a natural attribute of every manufacturing operation and process.

And nowhere is accuracy and its importance more clearly emphasized than in the case hardening of the gears used in Brown-Lipe Transmissions and Differentials.

A gear, to deliver maximum efficiency, must possess two characteristics within its structure—hardness and toughness.

The surface of the gear, which is constantly in contact with the surfaces of the opposing gears, must be so hard as to resist the wear due to this constant contact.

At the same time the body of the gears, or the core must be comparatively soft, strong and very tough.

If the whole gear tooth were hard enough to resist the wear caused by the contact of the gears in mesh then the gear would be so brittle as to be liable to fracture.

On the other hand if the entire gear including the tooth surfaces were tough enough to withstand fracture, then the surfaces of the gear would be so soft as to wear rapidly and you would soon have a faulty structure.

**Brown-Lipe Gear Co.**
TRANSMISSIONS

**Brown-Lipe-Chapin Co.**
DIFFERENTIALS

SYRACUSE, N. Y.

NEW YORK
Thos. J. Wetzel, 29 W. 42d St.

CHICAGO
K. Franklin Peterson, 122 So. Michigan Ave.

DETROIT
L. D. Bolton, 2215 Dime Savings Bank Bldg.

SAN FRANCISCO
A. H. Coates, 444 Market St.

Foreign Agent, Benjamin Whittaker, 2, Norfolk Street, Strand, London, W. C.




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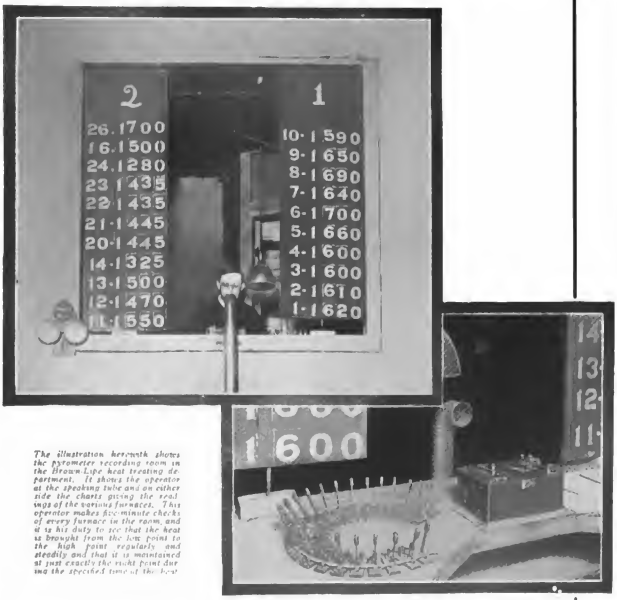
So, as stated above, it is essential that the surface of the gear to about 1-32 of an inch must be extremely hard while the balance of the gear must possess the characteristics of strength and toughness.

Years of research and actual experiment have developed certain methods and conditions in the heat treating process, that if followed carefully and accurately insure this result.

That Brown-Lipe practice does follow these methods and conditions carefully and accurately is clearly shown by the supremacy and dominancy of Brown-Lipe products throughout the motor car industry.




*The illustration herewith shows the pyrometer recording room in the Brown-Lipe heat treating department. It shows the operator at the speaking tube and on either side the charts giving the readings of the serving furnaces. This operator makes five-minute checks of every furnace in the room, and it is his duty to see that the heat is brought from the low point to the high point regularly and steadily and that it is maintained at just exactly the right point during the specified time of the heat*



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# Who Pays the Difference?

Every dealer knows that the underpriced truck is overvalued. When he sells on price he has to add to the value by throwing in a free service. This after-sale service is an expense—a heavy overload—a drain on his legitimate profit. And through this service the dealer actually pays the difference between the underpriced truck and the rightly priced—rightly built truck. The customers who buy, and the dealers who sell the

**Lippard-Stewart**

**Radiator at the Dash**

complete the transaction then and there. No aftermath of expense, repairs, adjustments—all that misnamed "service" that follows the sale of the jerry-built truck, but a clean sale for the dealer and *actual trucking service* for the buyer.

This Queen City Dairy Truck was wisely bought in competition with cars of all degree—and the buyer gladly paid the difference in price because of the vital difference in performance. Under competitive tests the Lippard-Stewart is an *order winner*.

Under rigid Government tests—strenuous army requirements and severe industrial conditions the Lippard-Stewart has come through clean every time. Every part of the car is selected—every specification is determined to meet the peculiar conditions of commercial hauling.

All down the line, Lippard-Stewarts are essentially trucks—from the 1000-pound delivery car to the 2-ton model.

It will pay you to learn the difference in trucks—the reason why of price and quality. It's a difference that has made the Lippard-Stewart the big trucking success of today.

If you are a dealer with a broad experience in the truck business and are tired of selling on a price basis—we'd like to talk things over with you. Our dealers have more than doubled in the last four months

*Write or wire us for our 1916 proposal.*

**Lippard-Stewart Motor Car Co., 233 W. Utica St., Buffalo, N. Y.**



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# Troy Trailers

## *Convinced* the Ford Motor Company that they would—

Double or triple the pay load.
Add practically nothing to tire or fuel expense.
Reduce equipment investment per ton of capacity.
Utilize draw bar pull otherwise wasted.
Make truck hauling practical by making it cheap.
Pull trucks out of the expense hole.
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The Ford Motor Company—and the Cadillac Company—the Studebaker Corporation—and John Wanamaker and many others of equal prominence made the most searching investigations of the ability of Troy Trailers to do these things. Proof that they were convinced lies in their purchase. They all ordered Troy Trailers.

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## SPRINGS

designed to insure

## Maximum of Elasticity and Endurance

with

## Minimum of Vibration

Genuine made only by

## The Mather Spring Company

Toledo, Ohio




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THE steadily increasing use of Ball Bearings in all power transmitting machinery is the most convincing proof of the efficiency and durability of ball bearings.

¶ Under the most extreme conditions, where high speeds and heavy loads are encountered, there you will find ball bearings most frequently used.

¶ And this condition is general. It is true of the machinery field—of the electrical industry—of the mining industry—of the milling industry—of the automobile industry.

¶ Where ultimate efficiency alone is considered, that is, where the greatest percentage of power is transmitted with the least frictional loss through the bearings, ball bearings will be found in dominant degree.

¶ And Hess-Brights have long been known to be the premier ball bearings of the world.

**The Hess-Bright Mfg. Co.**

**Philadelphia, Pa.**

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INTERNAL GEAR

SOLID FORGED I-BEAM DEAD AXLE

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The power being applied near the outer rim of the road wheels increases the leverage.

TORBENSEN DRIVE is efficient at all speeds—not simply at the highest.

Write us for facts, figures and demonstration of the Internal Drive

**Torbensen Gear & Axle Company**
CLEVELAND, OHIO

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The COMMERCIAL VEHICLE

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and
The Trade Paper

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Every wide-awake business man reads his own trade paper, a paper about the grocery business, about the coal trade, about brewing or any one of the other organs of particular trade.

The COMMERCIAL VEHICLE

is not a trade paper. It is a class paper. It deals with the problems of a peculiar class of business men. Those who operate motor commercial vehicles. As such it reaches all trades, and covers but one phase of the business of each trade—motor transportation.

It furnishes the business man with what his trade paper cannot give him in comprehensive form, for the subject of motor transportation is such a big one and so highly specialized that it requires the exclusive attention of a large and trained organization.

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## Chassis Price, $1650

*THE AUTOCAR COMPANY, ARDMORE, PA.*

*Established 1897* *MOTOR DELIVERY CAR SPECIALISTS*




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The COMMERCIAL VEHICLE
Read by Business Men

Vol. XIII January 15, 1916 No. 12

# Better Trucks for Less Money

## Lower Prices for Larger Capacities; Shaft Drive Makes Great Gain

**Increased Production Begets Improved Construction, Standardization, Higher Efficiency and More Simplicity**

VALUE—more of it for less money. That is what the buyer on the 1916 market is offered. He has demanded lower prices in the past, and, when good trucks of the proper capacity were not forthcoming, he sometimes bought cheap trucks or good trucks of insufficient capacity. Today, for less money, he will be sold a better truck, or more nearly ample capacity, for less investment.

Trade conditions have brought about two things which have made this possible: Greater production and greater standardization of component parts. Standardization includes not only uniform design and limits in manufacture, but in truckdom it means that these parts are made in a few large plants especially devoted to the production of large quantities of them.

Today, only a large producer can afford to manufacture a motor truck completely in his own shop, unless it be a very special design which will not meet the competition of the assembler. The large producer practically duplicates the economies of the parts manufacturer, while his passenger car business permits him to carry his enormous factory investment over dull periods.

Quantity production is responsible for the excellent value and reasonable prices for the manufactured product. The use of standard components, manufactured in great quantity by a few specialists and used by large numbers of competing assemblers, each of whom produces but a moderate output annually, permits each of these to produce quality trucks at a price which compares favorably with that attained by those who build their vehicles in the entire.

The average price for motor trucks has gone down from $2,528 to $2,413 in the face of rising material prices, decrease in the hours of labor and increase in pay. Correspondingly the capacity of the average truck has risen from 4,500 to 4,840 pounds.

By **average** as used here, and as used all elsewhere in this article, is meant the average of the models of all important makers, based on specifications published each year in THE COMMERCIAL VEHICLE for several years past. They do not contemplate the difference in the **number** of vehicles of different models produced. Thus, while the **average** design is of 4,840 pounds

**TRUCKS USING HOTCHKISS DRIVE**

Acason
Acme
Atterbury
Autocar
Available
Barker
Bessemer
Brinton
Brockway
Burford
Chase
Coleman
Continental (C)
Corbitt
Crore
Dart
DeKalb
Denby
Diamond-T
Dorris
Dominion Tractor
Fargo
F. W. D.
Gabriel
Garford
Gersix
Gramm-Bernstein
Hall
Hanger
Harvey
Henderson
I. H. C.
Independent
Indiana
Jeffery
Kearns
Kisselkar
Kleiber
Koehler
Krebs
Landshaft
Larrabee
Lippard-Stewart
Little Giant
Maccar
Mack
Modern
Morton
Netco
Old Reliable
Palmer
Paulding
Peerless
Republic
Rowe
Royal
Salvador
Sandow
Sanford
Selden
Service
Signal
South Bend
Stegeman
Sterling
Stewart (B)
Sullivan
Superior
Tower
Transport Tractor
United
U. S.
Velie
Vim
Walter
Watson
Wichita
Wilcox
Wilson
Witt-Will

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# The Trend in Load Capacity

| Tons | 1913 | 1914 | 1915 | 1916 | 1915 GAIN-LOSS | | 1916 GAIN-LOSS | | 3 YEARS' GAIN-LOSS | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Number | Per Cent | Number | Per Cent | Number | Per Cent |
| Less than ½ | 13 | 15 | 19 | 6 | 4 | 27.6 | −11 | −57.5 | − 5 | − 38.5 |
| ½ | 19 | 28 | 31 | 28 | 3 | 11.4 | − 3 | − 9.7 | 9 | 47.4 |
| ¾ | 47 | 48 | 44 | 40 | − 4 | − 8.7 | − 4 | − 9.1 | − 7 | − 14.9 |
| 1 | 59 | 72 | 68 | 65 | − 4 | − 5.5 | − 3 | − 4.4 | 6 | 10.2 |
| 1½ | 46 | 50 | 66 | 54 | 16 | 32.0 | −12 | −18.2 | 8 | 17.4 |
| 2 | 62 | 62 | 76 | 93 | 14 | 27.3 | 17 | 22.4 | 31 | 50.0 |
| 2½ | 5 | 10 | 19 | 17 | 9 | 90.0 | − 2 | −10.5 | 12 | 240.0 |
| 3 | 55 | 48 | 43 | 33 | − 8 | − 10.5 | −10 | −23.2 | −22 | − 40.0 |
| 3½ | 14 | 14 | 28 | 38 | 14 | 100.0 | 10 | 35.7 | 24 | 171.5 |
| 4 | 19 | 17 | 16 | 14 | − 1 | − 5.8 | − 3 | − 80.0 | − 5 | − 26.3 |
| 5 | 49 | 44 | 45 | 43 | 1 | 2.2 | − 3 | −44.3 | − 6 | − 12.3 |
| 6 | 9 | 16 | 18 | 14 | 1 | 6.3 | − 4 | −22.2 | 5 | 55.5 |
| 7 and over | 6 | 8 | 13 | 10 | 4 | 50.0 | − 2 | −16.6 | 4 | 66.6 |
| Tractors | ..... | ..... | ..... | (7) | ..... | ..... | ..... | ..... | ..... | ..... |

Based on specifications published in THE COMMERCIAL VEHICLE for 4 years, irrespective of the number of trucks of given model sold

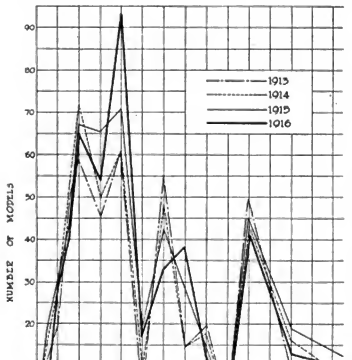
capacity, the average vehicle which will be sold in 1916 will be smaller, and will cost less. The above figures are therefore only an indication of **value**. As such, they show that **more** truck will be given the truck buyer for his money.

Value means quantity plus quality for a price. We have seen that truck manufacturers are offering more truck. They are also offering **better trucks**.

Last year chain-driven trucks predominated. This year shaft-driven trucks do. Last year 58¾ per cent of the models were chain-driven. This year but 33⅓ per cent are chain-

**TRUCKS USING WORM-GEAR DRIVE**

Aeason
Acme
Armleder
Atterbury
Available
Barker
Bessemer
Blair
Brinton
Brockway
Burford
Chase
Coleman
Continental (C)
Corbitt
Croce
Crowe
Dain
Dart
DeKalb
Diamond-T
Dorris
Dominion Tractor
Federal
Gabriel
Garford
Gary
G. A. Schacht
Gersix
G. M. C.
Gramm-Bernstein
Great Southern
Hall
Hanger
Harvey
Henderson
Horner
Hurlburt
Independent
Indiana
Kieselkar
Kleiber
Knickerbocker
Krebs
Larrabee




Number of models of different capacity offered on the American market during the last 4 years. Note the rise and decline of the 1-toneer, the spectacular growth of the number of 2-toneers, the consistent falling off in the number of 3-ton models and the consistent tendency to even up the number of models. This curve is based on the number of models made, not the number of chassis sold

**TRUCKS USING WORM-GEAR DRIVE (Continued)**

Lippard-Stewart
Little Giant
Locomobile
Lombard
Maccar
Mack
Martin
Menominee
Mogul
Modern
Moreland
Morton
Nelson & LeMoon
Neteo
New York
Old Hickory
Old Reliable
Packard
Palmer
Peerless
Pierce-Arrow
Robinson
Rowe
Royal
Salvador
Sandow
Selden
Service
Signal
South Bend
Standard
Stegeman
Sterling
Sullivan
Tifin
Tower
Transport Tractor
Universal
United
U. S.
Velie
Wichita
Wilcox
Wilson
Wilt-Will

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# The Trend in List Prices

| | AVERAGE PRICES | | | | 1915 GAIN-LOSS | | 1916 GAIN-LOSS | | 3 YEARS' GAIN-LOSS | |
|---|---|---|---|---|---|---|---|---|---|---|
| Tons | 1913 | 1914 | 1915 | 1916 | Amount | Per Cent | Amount | Per Cent | Number | Per Cent |
| Less than ½ | ..... | ..... | $439.50 | $429.17 | ..... | ..... | $ − 10.33 | − 2½ | ..... | ..... |
| ½ | $1,027.77 | $1,002.00 | 862.77 | 766.43 | $ − 139.23 | −14 | − 96.34 | −11½ | $ − 761.34 | −50 |
| ¾ | 1,358.33 | 1,453.16 | 1,328.99 | 1,234.00 | − 125.07 | − 8½ | − 94.99 | − 7¼ | − 124.33 | − 9¼ |
| 1 | 1,759.39 | 1,690.55 | 1,660.96 | 1,542.17 | − 29.57 | − 1¾ | − 28.81 | − 1¾ | − 117.22 | − 6½ |
| 1½ | 2,365.53 | 2,084.33 | 2,057.54 | 2,004.32 | 23.21 | 1¼ | − 53.22 | − 2½ | − 341.21 | −14½ |
| 2 | 2,635.36 | 2,565.48 | 2,433.27 | 2,287.93 | − 132.21 | − 5¼ | − 145.34 | − 6 | − 347.43 | −13 |
| 2½ | 2,950.00 | 2,957.14 | 2,740.00 | 2,481.21 | − 217.14 | − 7½ | − 258.79 | − 9½ | − 468.79 | −15⅞ |
| 3 | 3,095.88 | 3,323.33 | 3,271.32 | 3,147.73 | − 52.01 | − 1½ | − 123.59 | − 3¾ | 51.85 | 1½ |
| 3½ | 3,837.50 | 3,437.50 | 3,480.77 | 3,276.43 | 51.97 | 1½ | − 211.34 | − 6 | − 561.07 | −14½ |
| 4 | 3,841.66 | 3,877.77 | 3,337.50 | 3,417.50 | − 540.27 | −14 | 70.00 | 2 | − 424.16 | −11 |
| 5 | 4,366.66 | 4,350.00 | 4,312.90 | 4,311.36 | − 37.10 | − 8½ | − 1.24 | − ½ | − 55.00 | − 1¼ |
| 6 | 4,970.00 | 4,743.75 | 4,915.38 | 4,585.55 | 171.63 | 3½ | − 330.83 | − 7¼ | − 414.45 | − 8½ |
| and over | 5,600.00 | 4,620.00 | 4,394.44 | 4,667.50 | − 25.56 | − 5¼ | 293.06 | 6½ | − 912.50 | 16½ |
| Tractors | ..... | ..... | ..... | 3,825.00 | ..... | ..... | ..... | ..... | ..... | ..... |

Based on specifications published in THE COMMERCIAL VEHICLE for 4 years, irrespective of the number of trucks of given model sold

driven. Chain drive has lost nearly one-half its exponents. Shaft drive has gained from 41¼ per cent in 1915 to 66⅔ per cent in 1916. It has gained nearly two-thirds in the year.

Worm drive leads all the others with 44 per cent, a gain of more than 100 per cent over last year. Internal-gear drive registers 12.2 per cent, a gain of 68 per cent. Bevel drive has fallen off, as has also double-reduction drive.

This article has nothing to do with the relative merits of chain as against any one or all of the various forms of shaft drive, but that the change represents more value for the purchaser's outlay is certain, since it is the truck user's insistence upon shaft drive which has led American builders to make the change. A purchaser cannot get value, regardless of how hard the producer tries to inject quality into his wares, unless he gets what he wants, what he demands.

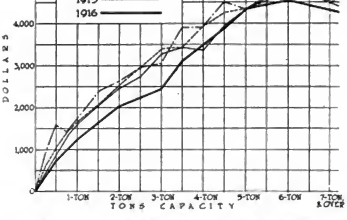
Certain structural advantages have accrued, however, to the adoption of inclosed drive. There are fewer parts to run the risk of being overlooked at oiling time. There is less exposed metal to rust and corrode. There are fewer working parts exposed to the action of grit and dirt. There are fewer wearing surfaces. The rear construction is simplified and it is made practicable to mount the gearbox in unit with the motor, so that the entire power and transmission assembly occupies but two groups, the power plant and the rear axle.

The mounting of the power plant has accordingly been simplified, being now mounted on three points, direct from the main frame, in most cases, so that a much simpler frame is possible. The radius rods and torsion members in a number of trucks have been eliminated and this duty imposed on springs built of special material and graded and guided especially to fulfill their two-fold mission.

So far, the use of Hotchkiss drive, for such is the term

**TRUCKS USING INTERNAL-GEAR DRIVE**

A. & B.
Bessemer
Bollstrom
Burford
Columbia
C. T.
Denby
Duplex
Fargo
G. V.-Mercedes
I. H. C.
Jeffery
Koehler
Landshaft
Mais
Palmer
Palmer-Moore
Paulding
Phoenix Centiped
Republic
Sanford
Selden
South Band
Stewart
Superior
Tiffin




Average prices for trucks of different capacity offered on the American market in 4 years. Note the steady decline in prices, with the low level reached by 1916. Also note the consistency of the present-day curve. The marked decline in the heaviest sizes is due to the rise of the tractor. This curve is based solely on the average prices of different models made, and not on chassis sold

**TRUCKS USING FOUR-WHEEL DRIVE**

Beech Creek
Bollstrom
C. T.
Couple-Gear
Duplex
F. W. D.
Hoadley
Jeffery
Morton
Nevada
Robinson
Walter
Ware
Weiar-Smith

**TRUCKS USING FRONT WHEEL DRIVE**

A. & B.
Watson

**TRUCKS USING CREEPER DRIVE**

Allis-Chalmers
Lombard
Phoenix Centiped

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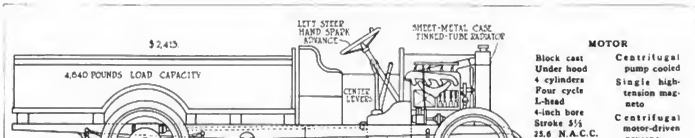
# The Average 1915 Motor Truck




**The composite truck design for 1916 representing the average of all principal points of design as based on the specifications of models of commercial chassis, published in this issue. These averages do not take into account the number of trucks of any given design sold, and so do not necessarily represent the average truck put into service in 1916**

used for this construction, is confined principally to the lighter vehicles, although there are a number of notable examples of its use in large trucks.

There is a number of trucks which, while they have eliminated the torsion member, have retained the radius rods, so that a sort of half-way Hotchkiss drive results. This gives very much more flexibility in the drive than is the case with a rigid torque member, but it does not impose such severe strains on the springs, so that these need not be so heavy, so expensive, or so firmly attached to the frame.

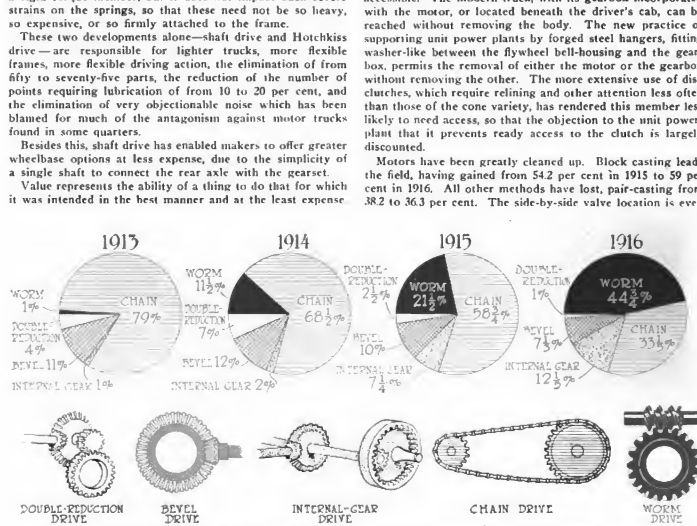
These two developments alone—shaft drive and Hotchkiss drive—are responsible for lighter trucks, more flexible frames, more flexible driving action, the elimination of from fifty to seventy-five parts, the reduction of the number of points requiring lubrication of from 10 to 20 per cent, and the elimination of very objectionable noise which has been blamed for much of the antagonism against motor trucks found in some quarters.

Besides this, shaft drive has enabled makers to offer greater wheelbase options at less expense, due to the simplicity of a single shaft to connect the rear axle with the gearset.

Value represents the ability of a thing to do that for which it was intended in the best manner and at the least expense By simplifying the chassis, engineers have achieved a corresponding simplification of the work necessary to maintain a motor truck in fit working condition. By inclosing all parts, they have provided against useless tampering. By reducing the number of oiling points they have increased the likelihood that such as remain will receive proper attention.

Simplification has also rendered the various parts more accessible. The modern truck, with its gearbox incorporated with the motor, or located beneath the driver's cab, can be reached without removing the body. The new practice of supporting unit power plants by forged steel hangers, fitting washer-like between the flywheel bell-housing and the gearbox, permits the removal of either the motor or the gearbox without removing the other. The more extensive use of disk clutches, which require relining and other attention less often than those of the cone variety, has rendered this member less likely to need access, so that the objection to the unit power-plant that it prevents ready access to the clutch is largely discounted.

Motors have been greatly cleaned up. Block casting leads the field, having gained from 54.2 per cent in 1915 to 59 per cent in 1916. All other methods have lost, pair-casting from 38.2 to 36.3 per cent. The side-by-side valve location is even




**Five principal final drive methods, showing their percentages in different years, based on models carried, irrespective of production**

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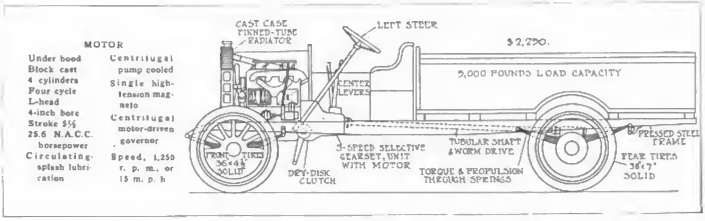
# The Tendency of 1915 Trends




**The composite of the most popular developments in truck design for 1915, representing the spirit in the trends in design over a period of 4 years, as determined by the specifications published for 1913, 1914, 1915 and 1916. This estimate is in no sense a prediction of future standards, but merely represents the tendency and does not consider the probable popularity of certain specific designs**

more popular than before, offering, as it does, the advantages of compactness, simplicity and ease of access to all the valve tappets and springs from one side. It is rivalled by none of the other valve positions.

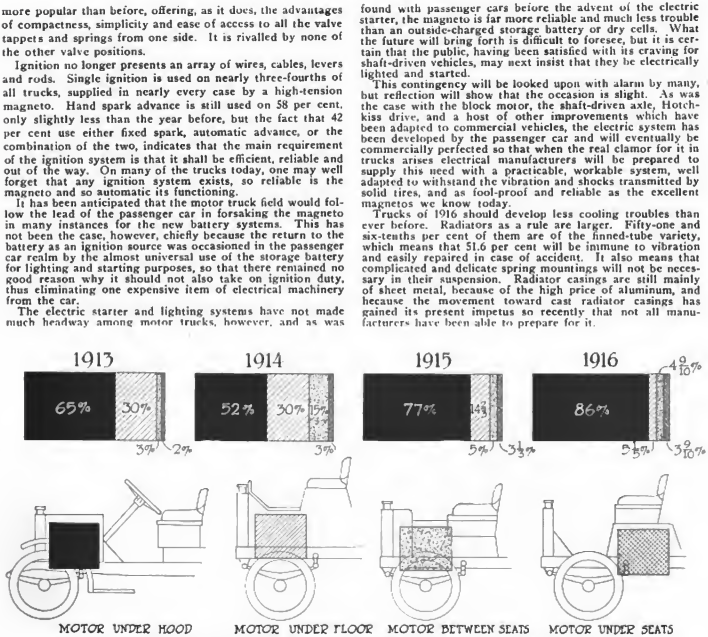
Ignition no longer presents an array of wires, cables, levers and rods. Single ignition is used on nearly three-fourths of all trucks, supplied in nearly every case by a high-tension magneto. Hand spark advance is still used on 58 per cent, only slightly less than the year before, but the fact that 42 per cent use either fixed spark, automatic advance, or the combination of the two, indicates that the main requirement of the ignition system is that it shall be efficient, reliable and out of the way. On many of the trucks today, one may well forget that any ignition system exists, so reliable is the magneto and so automatic its functioning.

It has been anticipated that the motor truck field would follow the lead of the passenger car in forsaking the magneto in many instances for the new battery systems. This has not been the case, however, chiefly because the return to the battery as an ignition source was occasioned in the passenger car realm by the almost universal use of the storage battery for lighting and starting purposes, so that there remained no good reason why it should not also take on ignition duty, thus eliminating one expensive item of electrical machinery from the car.

The electric starter and lighting systems have not made much headway among motor trucks, however, and as was found with passenger cars before the advent of the electric starter, the magneto is far more reliable and much less trouble than an outside-charged storage battery or dry cells. What the future will bring forth is difficult to foresee, but it is certain that the public, having been satisfied with its craving for shaft-driven vehicles, may next insist that they be electrically lighted and started.

This contingency will be looked upon with alarm by many, but reflection will show that the occasion is slight. As was the case with the block motor, the shaft-driven axle, Hotchkiss drive, and a host of other improvements which have been adapted to commercial vehicles, the electric system has been developed by the passenger car and will eventually be commercially perfected so that when the real clamor for it in trucks arises electrical manufacturers will be prepared to supply this need with a practicable, workable system, well adapted to withstand the vibration and shocks transmitted by solid tires, and as fool-proof and reliable as the excellent magnetos we know today.

Trucks of 1916 should develop less cooling troubles than ever before. Radiators as a rule are larger. Fifty-one and six-tenths per cent of them are of the finned-tube variety, which means that 51.6 per cent will be immune to vibration and easily repaired in case of accident. It also means that complicated and delicate spring mountings will not be necessary in their suspension. Radiator casings are still mainly of sheet metal, because of the high price of aluminum, and because the movement toward cast radiator casings has gained its present impetus so recently that not all manufacturers have been able to prepare for it.




**Four leading locations for the motor, showing proportion of popularity each of 4 years in per cent, representing models not production**

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# Trends in Truck Design

| Feature | AVERAGE DESIGN | | | | GREATEST GAINS | | | Tendency for Future |
|---|---|---|---|---|---|---|---|---|
| | 1913 | 1914 | 1915 | 1916 | 1914 | 1915 | 1916 | |
| Capacity, tons | 2½ | 2½ | 2¼ | 2½ | 1 | 1½ | 2 | 2½ |
| Price | $3,500 | $3,058 | $2,528 | $2,413 | lower | lower | lower | $2,250 |
| Tires, kind | solid | solid | solid | solid | ..... | pneumatic | steel | solid |
| Front tires | ..... | 36x4 single | 35x4 single | 35x4½ single | ..... | ..... | ..... | 36x4½ single |
| Rear tires | ..... | 36x3½ dua | 36x3½ dual | 38x5 single | Single | Single | 36 single | 38x7 single |
| Motor location | under hood | under hood | under hood | under hood | between seats | under hood | under hood | under hood |
| Cylinders | 4 | 4 | 4 | 4 | 4 | 4 | 6 | 4 |
| Valves | side | side | side | side | side | side | side | side |
| Bore | 4½ | 4½ | 4⅛ | 4 | smaller | larger | smaller | 4 |
| Stroke | 5½ | 5¼ | 5¼ | 5½ | ..... | ..... | shorter | 5 |
| N.A.C.C. horsepower | 28.9 | 27.2 | 27.6 | 25.6 | less | more | less | 25.6 |
| Cooling | pump | pump | pump | pump | ..... | ..... | thermo-syphon | pump |
| Ignition, magneto | dual | dual | single | single | single | single | single | single |
| Spark advance | hand | hand | hand | hand | automatic | fixed | fixed | fixed |
| Final drive | chain | chain | chain | worm | worm | worm | worm | worm |
| Steering | right | left | left | left | left | left | left | left |
| Levers | right | center | center | center | center | center | center | center |
| Propulsion | radius rods | radius rods | radius rods | radius rods | springs | springs | springs | springs |

Based on specifications published in THE COMMERCIAL VEHICLE for 4 years, irrespective of the number of trucks of given model sold

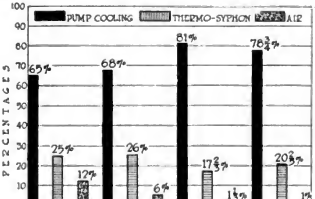
Pump water circulation holds it own, although thermo-syphon cooling is gaining. There seems to be every reason to place considerable confidence in the prediction by some that the development of better radiators, especially built for trucks, foreshadows a more extensive employment of natural circulation of water.

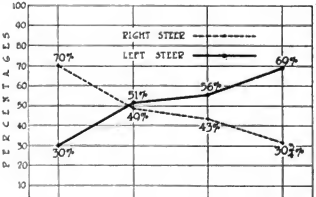
There still remains a very respectable coterie of builders who refuse to apply governors to their chassis on the largely valid plea that the ordinary types restrict the power of the motor at the time when that power is most needed, and with the sage remark that a driver who cannot be trusted to keep his truck within reasonable limits of speed, who habitually races his motor idle, is more than likely to be a match for any governor that crosses his will.

There is much in this pessimistic view of the governor situation that merits the earnest thought of the most enthusiastic. If governors really do restrict the power of motors when in the lower gears, perhaps the employer who is in the habit of seeing a job through, regardless of obstacles, should not blame the driver too much if he disconnects the one on his mount. There is much comfort, however, in the fact that there is considerable development of transmission drives and duplex drives for governors, which certainly remove the principal grounds for objection to governors, although the transmission drive is no protection against motor racing.

In discussing the trend of thought in motor truck development it would be sadly amiss were nothing said about tires. The fields of pneumatics and solids seem to be firmly established in practice, for neither has gained on the other in the year past. The use of dual pneumatics for 1½- and 2-ton trucks has not increased, because it has been found that on bad streets—which prevail in our cities—dual pneumatics do not stand up well. This is explained by the fact that on uneven surfaces the load is constantly being shifted from one tire to the other, so that at times one tire is called upon to take a load intended for two. This overloading cannot long be withstood by the best of tires.

For the same reason strong efforts are being made to get away from dual solids insofar as possible. Just a year ago one tire maker brought out giant pneumatics—up to 12 inches in width and 48 inches in diameter—so recently 8-, 10 and 12-inch solids have appeared. These have not as yet found their way into stock specifications, but their performance has been such as to cause at least one tire manufacturer to




Thermo-syphon cooling furnishes grounds for interesting speculation in considering cooling methods—There is little doubt as to the trend in driving position. The discrepancy in the percentage is due to the appearance of center steer, not plotted

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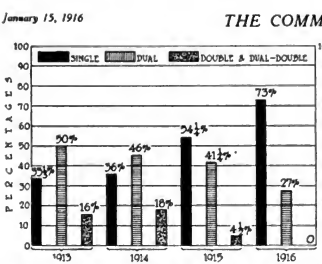


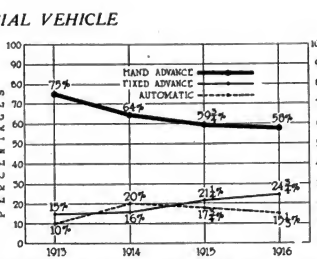


**Having driven double ignition from the field, the single magneto is now steadily crushing the dual-ignition column to earth—Fixed and automatic spark advance are pulling down the hand-advance curve. How would you draw the 1917 curve?**

carry them as stock sizes and to recommend them instead of 4-, 5-, 6- and 7-inch duals.

Last year 51.5 per cent of trucks offered had single rear tires. This year 55 per cent are so equipped, in spite of a rise in average capacity, as hereinbefore mentioned.

The future holds, not alone in the matter of sales but in technical development, an interesting mystery. Looking back over the years that have gone before, we have seen trucks steadily getting better, while their prices decreased. In the new series of many manufacturers radical changes have been made. The change from chain drive to shaft drive, from separated units to unit powerplants, from rigidity to flexibility of chassis frame and driving stays, and the myriad minor eductions have all involved tremendous expenditures, but the changes have likewise been fraught with many corresponding economies in manufacture, due to simplified machining, assembling and erecting processes, directly traceable to simplification.

The open-handed and far-seeing policy of the industry in this development strongly bespeaks its confidence in the future.

# Percentage Report on Status of Principal Features of Design for 1916 Contrasted With Those of 1915 Practice

| Kinds of Tires | 1915 | 1916 |
|---|---|---|
| Solid | 87.5 | 87.5 |
| Pneumatic | 11.3 | 11.3 |
| Steel | 0.3 | 0.7 |
| Cushion | 0.5 | 0.5 |
| Wood | 0.3 | 0.0 |

| Tire Sizes | | |
|---|---|---|
| Front | 35x4 | 35x4½ |
| Rear | 36x3½* | 38x6 |
| Front, single | 98 | 97.6 |
| Front, dual | 2 | 2.4 |
| Rear, single | 51.5 | 55 |
| Rear, dual | 48.5 | 45 |

| Motor Location | | |
|---|---|---|
| Under hood | 77 | 86 |
| Between seats | 5.3 | 4.9 |
| Under floor | 13 | 4.2 |
| Under seats | 3 | 3.9 |
| Under body | 1.6 | 1 |

| No. of Cylinders | | |
|---|---|---|
| Four | 96 | 96.6 |
| Two | 3.4 | 2.4 |
| Six | 0.3 | 1 |
| Three | 0.3 | 0.0 |

| Engine Size | | |
|---|---|---|
| Average bore | 4 1/6 | 4 |
| Average stroke | 5 1/4 | 5 1/5 |
| N. A. C. C. h.p. | 27.6 | 25.6 |

| Cylinder Casting | | |
|---|---|---|
| In block | 54.2 | 59 |
| In pairs | 38.2 | 36.3 |
| Singly | 7.3 | 4 |
| In threes | 0.3 | 0.7 |

| Valve Location | | |
|---|---|---|
| Side | 71 | 78.5 |
| Opposite | 17.5 | 14 |
| Side and head | 3.5 | 3.8 |
| In head | 7 | 3 |
| Top, two-cylinder | 0.5 | 0.8 |
| Back, two-cylinder | 0.0 | 0.3 |
| Two-cycle | 0.5 | 0.3 |
| Sleeve, Knight type | 0.0 | 0.3 |

| Water Circulation | 1915 | 1916 |
|---|---|---|
| Centrifugal pump | 75.5 | 75.7 |
| Thermo-syphon | 17.6 | 20.4 |
| Gear pump | 5.5 | 2.9 |
| Air-cooled | 1.4 | 1 |

| Radiator Core Type | | |
|---|---|---|
| Finned-tube | 42 | 51.6 |
| Cellular | 27.2 | 29.2 |
| Square-tube | 22 | 14.2 |
| Zig-zag-tube | 8.8 | 4 |
| Ring type | 0.0 | 1 |

| Radiator Case Type | | |
|---|---|---|
| Cast | ... | 70.2 |
| Sheet | ... | 29.8 |

| Ignition | | |
|---|---|---|
| Single | 54.2 | 73 |
| Dual | 41.2 | 27 |
| Double | 2.3 | 0.0 |
| Dual-double | 2.3 | 0.0 |

| Spark Advance | | |
|---|---|---|
| Hand | 59.7 | 58 |
| Fixed | 21.3 | 24.7 |
| Automatic | 17.4 | 15.3 |
| Two-point fixed | 1.6 | 1.5 |
| Automatic-hand | 0.0 | 0.5 |

| Governor Type | | |
|---|---|---|
| Centrifugal | 59.7 | 45.3 |
| Suction | 7.5 | 24.8 |
| Loose-ball | 8.5 | 5.3 |
| Hydraulic | 1.3 | 0.6 |
| Electric | 0.0 | 0.3 |
| Ring | 0.6 | 0.0 |
| None | 22.4 | 23.5 |

| Governor Drive | | |
|---|---|---|
| From motor | 90.8 | 87.5 |
| Duplex | 0.7 | 5.3 |
| From driveshaft | 4.2 | 2.9 |
| From gearset | 2.9 | 1.4 |
| From front wheel | 1.5 | 0.9 |

| Average Speed | 1915 | 1916 |
|---|---|---|
| R. p. m. of engine | 1,150 | 1,233 |
| M. p. h. of truck | 15 7/16 | 15 1/3 |

| Lubrication | | |
|---|---|---|
| Circulating splash | 52 | 57 |
| Splash-pressure | 34 | 30.4 |
| Pressure | 5.8 | 10.2 |
| Non-circulating splash | 7.7 | 2.2 |
| Fuel injection | 0.5 | 0.2 |

| Clutch Type | | |
|---|---|---|
| Dry disk | 28 | 48 |
| Cone | 42.2 | 26.3 |
| Disk-in-oil | 17.8 | 13.1 |
| Dry plate | 8 | 9 |
| Expanding-shoe | 2.1 | 1.3 |
| Plate-in-oil | 1.1 | 1.1 |
| Contracting-band | 0.4 | 0.9 |
| Reversed cone | 0.4 | 0.3 |

| Gearset Type | | |
|---|---|---|
| Selective | 78.7 | 83.6 |
| Individual clutch | 8.4 | 7.1 |
| Progressive | 5.5 | 4.9 |
| Electric | 2 | 1.7 |
| Friction | 2.5 | 1.2 |
| Planetary | 2.2 | 1 |
| Roller | 0.0 | 0.5 |
| Hydraulic | 0.3 | 0.0 |

| Gearset Location | | |
|---|---|---|
| Unit with motor | 33 | 52.2 |
| Amidships | 27.3 | 29 |
| Unit with jackshaft | 37.3 | 17.6 |
| Unit with axle | 2.3 | 1.2 |
| Unit with driveshaft | 0.2 | 0.0 |

| Speeds Forward | | |
|---|---|---|
| Three speeds | 82 | 76.6 |
| Four speeds | 11.5 | 19.9 |
| Two speeds | 4.2 | 2.6 |
| Infinite | 2.3 | 0.7 |
| Eight speeds | 0.0 | 0.2 |

| Total Gear-ratio | |
|---|---|
| Average in high | 8 2/3-1 8 3/4-1 |

| Final Drive | 1915 | 1916 |
|---|---|---|
| Top worm | 21.5 | 44.5 |
| Double chain | 57.5 | 33.2 |
| Internal gear | 7.3 | 12.2 |
| Bevel | 10 | 7.3 |
| Double-reduction | 2.5 | 1 |
| Spur gear | 0.0 | 1 |
| Rollers | 0.0 | 0.4 |
| Single chain | 1.2 | 0.2 |
| Bottom worm | 0.0 | 0.2 |

| Torsion Members | | |
|---|---|---|
| Springs | ... | 81 |
| Torque-arm | ... | 9.8 |
| Torsion-tube | ... | 6.4 |
| Sub-frame | ... | 2.1 |
| Radius rods | ... | .7 |

| Propulsion Means | | |
|---|---|---|
| Radius rods | 72.7 | 48.6 |
| Springs | 23 | 47.3 |
| Torsion-tube | 3 | 1.7 |
| Sub-frame | 0.0 | 1.7 |
| Torque-arm | 1.3 | 0.7 |

| Springs, Front | | |
|---|---|---|
| Half-elliptic | ... | 96.7 |
| Elliptic | ... | 2 |
| Platform | ... | 0.5 |
| Coil | ... | 0.5 |
| Cantilever | ... | 0.3 |

| Springs, Rear | | |
|---|---|---|
| Half-elliptic | ... | 88.4 |
| Platform | ... | 6.6 |
| Elliptic | ... | 2.7 |
| Three-quarter-elliptic | ... | 1.4 |
| Cantilever | ... | 0.7 |
| Coil | ... | 0.2 |

| Steering Wheel | | |
|---|---|---|
| Left | 56.7 | 69 |
| Right | 43.3 | 30.8 |
| Center | 0.0 | 0.2 |

| Levers | | |
|---|---|---|
| Center | 64.8 | 76 |
| Right | 29 | 18.5 |
| Left and center | 1.2 | 2.9 |
| Left | 3.5 | 2.6 |
| Right and center | 1.5 | 0.0 |

*Dual.

**Based on specifications published in THE COMMERCIAL VEHICLE for 4 years, irrespective of the number of trucks of given model sold**

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# Résumé of Plans and Products of American Commercial Vehicle Manufacturers

## *1916*

Illustrated Notes on Vehicles and Builders, With Changes in Construction and Methods of Manufacture and Sale Outlined Briefly for Buyers' Information

**Part II - F-L**

## Forschler

### TWO CHAIN - DRIVEN MODELS, OF 1½ AND 3 TONS

**Phillip Forschler Wagon Co., New Orleans, La.**

ONE OF THE FEW trucks manufactured in the extreme south, Forschler vehicles are offered in 1½ and 3-ton sizes, both chain-driven. The outstanding characteristic of the Forschler truck is the use of two separate and independend frames, one for the motor and driving mechanism, supported on special springs, and one for the body and load. By this means the mechanism is protected from shocks whether the truck is loaded or empty.

Both models are similar in design and are an assembled product offered for sale mainly in Louisiana.

## Gabriel

### ¾-, 1- AND 1½-TON MODELS

**Gabriel Auto Co., Cleveland, O.**

ADDING a 1-ton worm-driven model and dropping its 1,000-pound bevel-driven unit, the Gabriel company carries over from 1915 its ¾-ton and 1½-ton worm-driven vehicles. The motor of the 1915 ¾-tonner has been changed and made the same as that furnished in the two other 1916 models.

Each unit is similar in design and follows standard truck practice. Electric starting and lighting units are furnished as extra equipment. Gabriel trucks are guaranteed when used in connection with trailers.

## Garford

### SEVEN MODELS COMPRISE 1916 LINE

**Garford Motor Truck Co., Lima, O.**

GARFORD trucks for 1916 are offered in a complete line of seven models, ranging in capacity from 1,500 pounds to 12,000 pounds. The individual models consist of chain-driven vehicles of 1,500 pounds, 5 and 6 tons capacity, and worm-driven units of 1-, 1½-, 2- and 3½-ton capacity. The latter is a brand new model for 1916, with its motor under the floor instead of between the seats as was the former Garford pactice.

The Garford company underwent a reorganization during 1915, changed its name from the Garford Co. to the Garford Motor Truck Co., and changed the location of the place of manufacture from Toledo to Lima, O. Along with the change in the company came a change in the design of the trucks. The five models made at the beginning of 1915 of 2-, 3-, 4-, 5- and 6-ton capacity were all chain driven and all had their motors between the seats. The 5- and 6-ton models are still made for 1916, but each has a larger motor than before. The 1916 1-, 1½- and 2-ton models employ worm drive and each has its motor under a conventional hood forward of the dash.

Garford trucks are partly manufactured and partly assembled. They are offered for sale all over the United States and also abroad. The Garford company sells its vehicles as chassis or as complete trucks, the bodies for which are made in its own factory. It does not indorse electric starting and lighting systems for trucks of heavy tonnage, but furnishes such equipment at extra cost on its lighter vehicles. Garford trucks are built for use with trailers.

## Gary

### FOUR WORM-DRIVEN MODELS, ¾ TO 2 TONS

**Gary Motor Truck Co., Gary, Ind.**

GARY TRUCKS, first manufactured in 1915, are offered for 1916 in four models of ¾-, 1-, 1½- and 2-ton capacity, all worm driven. They are an assembled product, each model following the same general design with its motor under a conventional hood, a unit powerplant, dry-disk clutch and three-speed selective gearset. The frame of each model is of pressed steel and single solid tires are used all around.

## Gay

### CHAIN-DRIVEN ¾- AND 1-TON MODELS

**S. G. Gay Co., Ottawa, Ill.**

GAY TRUCKS, first made in 1913, are continued for 1916 practically without changes. The line consists of two models, a ¾-tonner and a 1-ton unit, both double-chain driven. Each model follows the same general design with its motor under a hood forward of the dash and the drive through a cone clutch to a three-speed gearset incorporated with the jackshaft.

Gay trucks are partly manufactured and partly assembled and are sold mostly in Illinois and adjacent states.

The Gay company is a long-established manufacturer of horse-drawn vehicles.

## G. A. Schacht

### 2- AND 3-TON MODELS

**G. A. Schacht Motor Truck Co., Cincinnati, O.**

CONTINUED without change from 1914, the G. A. Schacht line for 1916 consists of two models of 2- and 3-ton capacity, each worm-driven. Both models are a partly-manufactured and partly-assembled product which is sold throughout the United States and also abroad.

Both models follow the same general design and use heavy radius rods attached outside of the frame to take propulsion.

## G. M. C.

### TEN MODELS FROM ¾- TO 5-TON CAPACITY

**General Motors Truck Co., Pontiac, Mich.**

G. M. C. gasoline trucks for 1916 are offered in a complete line of ten models of ¾- to 5-ton capacity, all of which were new designs in 1915 except the ¾-tonner. Besides the ¾-ton unit the line consists of two models of 1¼-ton capacity, one of 1½ tons, two of 2-ton burden, two of 3½-ton size, and two of 5-ton design. The ¾-tonner is bevel driven and the 1¼-ton unit worm driven. One model of each of the 1¼-, 2-, 3½- and 5-ton sizes is chain driven, and the other worm driven. Features of the new models are the use of smaller and higher-speed motors and four-speed instead of three-speed gearsets.

G. M. C. trucks are partly assembled and partly manufactured and are sold throughout the United States and abroad.

## Geneva

### ½- AND ¾-TON MODELS ON SAME CHASSIS

**Geneva Wagon Co., Geneva, N. Y.**

CARRIED OVER from 1915 without change, Geneva trucks are offered in two models of 1,000- and 1,500-pound capacity. Both models use the same chassis, the difference in load capacity being due to the weight of the different type of body regularly furnished with each model. The lighter unit is fitted with a closed body and the heavier one with a relatively light open body.

The Geneva truck is practically an assembled product and sold principally in New York state. It is characterized by a two-cylinder motor under a hood with the radiator on the dash, a planetary gearset and double-chain final drive.

## Gersix

### A WORM-DRIVEN MODEL OF 2½ TONS

**Gerlinger Motor Car Co., Portland, Ore.**

NEW IN 1915, and one of the few trucks made on the Pacific coast, the Gersix vehicle is made in but one model of 2½ tons capacity. It is a worm-driven unit, assembled from standard parts, which is offered for sale principally in the western states.

It follows accepted truck practice in design and is furnished with an electric starting and lighting unit as standard equipment.

## Globe

### ¾-TON MODEL WITH SIX-CYLINDER MOTOR

**Globe Furniture Co., Northville, Mich.**

NEW FOR 1916, the Globe ¾-ton light delivery truck is characterized by its six-cylinder motor and internal-gear-driven rear axle. It is an assembled product to be marketed by a special department of the long-established Globe furniture-manufacturing company.

It follows accepted truck engineering design and has its clutch and gearset assembled in a unit with the motor.

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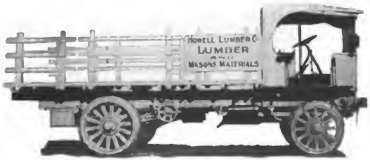
The 1,500-pound bevel-driven Gabriel

The largest of the Gabriel three-model line, a worm-driven 1½-tonner

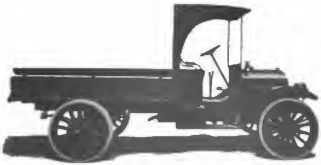
One of the new worm-driven 1-ton Garfords with its motor under a hood, the characteristic Garford Roman dash and folding backrests on seats

The new 1½-ton G. M. C. worm-driven model. It is equipped with a four-speed gearset. To the left, an end view of the Timken axle, double-internal brakes and radius rods




A Garford chain-driven 3tonner equipped with a special type of lumber body

A G. A. Schacht 2-tonner, one of two models of 2- and 3-ton capacity, both worm driven



The Gary ¾-tonner, one of a new line of worm-driven trucks offered in four models from ¾ to 2 tons capacity

A G. V.-Mercedes 6-ton internal-gear driven truck built in this country by the General Vehicle Co. under license of the Daimler company of Germany

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## Gramm-Bernstein

### FIVE MODELS, 1 TO 6 TONS, ALL WORM DRIVEN

**Gramm-Bernstein Co., Lima, O.**

WORM DRIVE is used on each of the five 1916 models of Gramm-Bernstein trucks. During 1915 the product of the Gramm-Bernstein company was known as the B. A. Gramm truck, but for 1916 the name has been changed back to what it was previous to last year. The line consists of 1-, 1½-, 2½-, 3½- and 6-ton models. It is featured by the 6-ton worm-driven unit, the only truck of this size on the market with final worm drive. Last year the offering consisted of chain-driven models of 1- and 6-ton capacity and worm-driven units of 2- and 3½-ton sizes. All except the 3½- and 6-tonners have been discontinued for 1916. The six-cylinder motor of last year's 6-ton unit has been replaced by a four-cylinder type.

All parts of the Gramm-Bernstein trucks are manufactured at the company's plant except the motors and accessories. They are sold throughout the United States and in Europe and South America. When the credit of the purchaser is considered good, Gramm-Bernstein trucks may be bought on a time basis in which one-third of the price is required on order and the balance in not more than twelve monthly payments.

Electrical lighting and starting units are furnished on the trucks as extra equipment. They are guaranteed for trailer use.

## Great Southern

### BOTTOM-WORM-DRIVEN 2- AND 4-TONNERS

**Great Southern Automobile Co., Birmingham, Ala.**

FIRST put on the market in 1915 in the form of a twenty-five passenger bus, the Great Southern chassis is an assembled product which is offered in 2-ton and 4-ton sizes for commercial purposes.

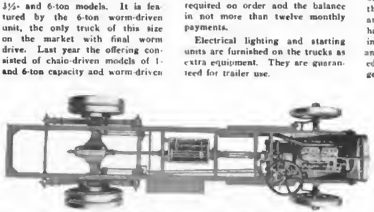
The outstanding characteristic of the vehicle is its low frame and bottom-worm drive. The frame at the rear arches under the axle. The arched section carries the spring hangers and consists of a steel casting which laps with the forward and back frame sections and is riveted in place. This construction, together with the underslung springs at both front and rear, places the body floor, directly on top of the frame, only 26 inches above the ground. This eliminates the use of more than one step, a very desirable feature for bus work. The bottom-worm unit is made by the Great Southern company and as placed in the vehicle has 7 inches clearance above the ground.

## G. V.—Mercedes

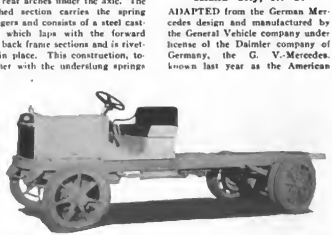
### INTERNAL-GEAR-DRIVEN 6-TONNER

**General Vehicle Co., Long Island City, N. Y.**

ADAPTED from the German Mercedes design and manufactured by the General Vehicle company under license of the Daimler company of Germany, the G. V.-Mercedes, known last year as the American



Typical plan view of the Gramm-Bernstein trucks showing right steer, individual clotch gearset mounted amidships and final worm drive

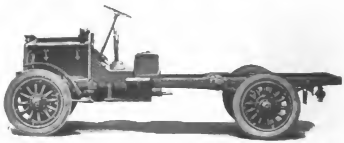


A 3½-ton Gramm-Bernstein fitted with steels front and rear. These are furnished instead of wood at extra cost

A 6-ton worm-driven Gramm-Bernstein truck fitted with all-steel body and power-dumping mechanism

The worm-driven Hall 3½-tonner

The Haha 2-tonner, one of a line of four worm-driven models



The Hurlburt 1-ton worm-driven model. Hurlburt trucks are made in New York City

The Horner 2-ton truck which can be bought with either chain or worm final drive

The big brother of the 1-ton Hurlburt shown directly above. It is of 3½-ton capacity and is worm driven

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Daimler, is continued for 1916 without change. It is made in but one model of 6 tons capacity and is featured by internal-gear drive and steel wheels.

All the truck parts are made at the General Vehicle plant. The vehicle is regularly guaranteed for use in connection with trailers.

The General Vehicle company also manufactures electric trucks and electric industrial vehicles and in addition brought out during the past year a special gas-electric tractor for the use of the New York City Street Cleaning Department

## Hall

### OPTIONAL-DRIVE 3½-TONNER AND 5-TON UNIT

### Lewis-Hall Iron Wks., Detroit

MAKING ITS DEBUT in 1915, the Hall truck is continued without change for 1916. The line consists of three models, two of 3½ ton capacity, one with worm drive and the other chain drive, and a 5-ton chain-driven unit. Hall trucks are an assembled product to be sold throughout the United States.

The Lewis-Hall company does not indorse the use of electric starting and lighting units on its vehicles. Hall trucks are indorsed for use with trailers.

## Hanger

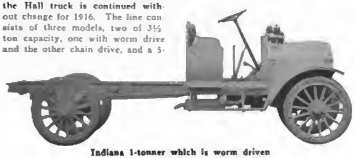
### ONE WORM-DRIVEN ½-TONNER

### C. F. Hanger Co., Cleveland, O.

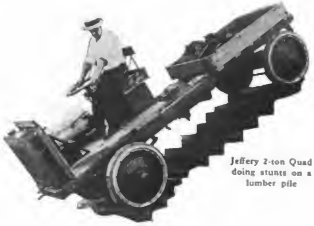
NEW IN 1915, the Hanger line for 1916 consists of one model, a 1,000-pound worm-driven model for light delivery work. It is an assembled product principally sold in Cuyahoga County, Ohio.

An electric lighting and starting unit is furnished as extra equipment. The Hanger truck is indorsed for use with light trailers.

Indiana 3-tonner, showing new radiator form



Indiana 1-tonner which is worm driven



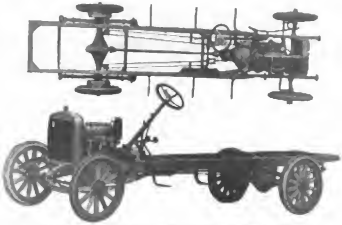
Jeffery 2-ton Quad doing stunts on a lumber pile

5-ton Kelly-Springfield, showing aluminum dash and French hood

I-H-C internal-gear-driven 1-tonner

1-ton Kelly-Springfield

New 2-ton worm-driven Kissel-kar



Side and plan views of Kissel-kar 2,000-pound model chassis

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## Hannibal

### ONE ½-TON MODEL

**Hannibal Motor Car Co., Hannibal, Mo.**

FIRST PRODUCED in 1915, the Hannibal truck is made in but one model of 1,000 pounds capacity, designed especially for light delivery work. It is partly assembled and partly manufactured and is sold locally.

The Hannibal Motor Car Co. is a subsidiary of the Hannibal Wagon Co., long established in the wagon-making business.

## Hahn

### WORM-DRIVEN MODELS OF 1, 1½, 2 AND 3½ TONS

**Hahn Motor Truck Co., Hamburg, Pa.**

HAHN TRUCKS, new for 1916, are made by one of the pioneer wagon-building concerns of Pennsylvania. They are offered in four models of 1-, 1½-, 2- and 3½-ton capacity, all worm driven. Each model follows the same general design with right steer and center control and a unit power plant with the motor under a conventional hood forward of the dash.

Hahn trucks are an assembled product which it is expected will be offered for sale principally in the east.

## Hoadley

### FOUR-WHEEL-DRIVEN 2-TONNER

**Hoadley Bros., Gosport, Ind.**

NEW IN 1915, the Hoadley 2-tonner is characterized by its novel design of four-wheel chain drive and fifth-wheel steer. The truck consists of standard type of frame and a standard motor placed under a hood forward of the dash. Both front and rear axles and springs are carried on separate sub-frames, each of which has a fifth-wheel on its top on which the main frame of the truck is supported.

The jackshafts are mounted on the sub-frames and drive each wheel through a side chain outside of the frame. The jackshafts are driven through jointed driveshafts which in turn are driven by spur gears connected with a shaft attached to the gearset. The turning of the fifth-wheels is accomplished by means of a rack-and-pinion device.

## Henderson

### TWO MODELS, 1,200 POUNDS AND 1 TON

**Henderson Bros., North Cambridge, Mass.**

TWO WORM-DRIVEN MODELS is the offering of the Henderson concern for 1916. The smaller model has a capacity of 1,200 pounds and the larger one 1 ton. Both follow the same general design and are an assembled product sold entirely in the New England states and principally in Massachusetts at the present time. They may be bought on a time-payment plan, requiring an initial deposit of 40 per cent with the order and the balance within a year.

Henderson vehicles are furnished with electrical starting and lighting systems as extra equipment. The vehicles are not indorsed for use with trailers.

## Harvey

### TWO WORM-DRIVERS OF 3½ AND 5 TONS

**Harvey Motor Truck Wks., Harvey, Ill.**

AN ENTIRELY NEW worm-driven line of two models in the Harvey offering for 1916. It consists of a 3½-ton unit and a 5-tonner, each following the same general design and adhering closely to accepted standard practice. The 1915 offering of chain-driven 1½- and 3-tonners has been discontinued.

Harvey trucks are an assembled product principally sold locally.

## Horner

### FOUR MODELS, THREE WITH OPTIONAL DRIVE

**Detroit-Wyandotte Motor Co., Wyandotte, Mich.**

CONTINUED FROM 1915 without change, except for the discontinuation of a 1-ton chain-driven unit, the 1916 Horoer line consists of 1½-, 2-, 3- and 5-ton models, the first three of which are offered with either chain or worm drive.

The Horner truck was formerly the Grabowsky. The Horner company started in business in January, 1913, at which time the Grabowsky Power Wagon Co. was dissolved.

## Hurlburt

### 1-, 2- AND 3½-TON, ALL WORM DRIVEN

**Hurlburt Motor Truck Co., New York City**

ONE of the pioneer worm-driven motor trucks on the American market, Hurlburt trucks, previously sold mostly in New York City and vicinity, will hereafter be offered for sale in other parts of the United States, the Hurlburt company having secured recently a new plant with greatly increased manufacturing facilities. The complete line consists of three models, all of which are worm driven and all of which follow the same general design. The capacities are 1, 2 and 3½ tons. The Hurlburt truck is an assembled product. Electric ignition and lighting units are furnished as standard equipment on the two larger models only.

## I. H .C.

### FOUR MODELS RANGE FROM ½ TO 1 TON

**International Harvester Corp., Akron, O.**

FOUR MODELS constitute the I. H. C. line for 1916. Of these, two are brand new, one of which differs entirely from all previous I. H. C. vehicles. The latter has a four-cylinder motor under a French hood with the radiator on the dash instead of the motor under the body as heretofore. It also has internal-gear drive instead of the double-chain drive previously employed on all I. H. C. trucks.

The complete line consists of two 1,000-pounders carried over from last year, a new 1,500-pound unit similar in design to the old-timers, and the new 1-ton internal-gear-driven vehicle. One 1,000-pounder has a two-cylinder air-cooled motor under the body, 42-inch wheels and double-chain drive. The second ½-tonner is similar in construction except that it has a water-cooled motor and 36-inch wheels all around, the change in wheel diameters being carried out in 1915. The 1,500-pound model is similar to the water-cooled ½-tonner. The 1-tonner is entirely new.

The three smaller models are a manufactured product exclusively, while the internal-gear-driven unit is principally an assembled job. I. H. C. trucks are sold in every state in the Union.

The three smaller vehicles are mostly sold complete with body and the internal-gear-driven model can be purchased in the same way if desired.

## Independent

### TWO WORM-DRIVEN MODELS, ¾- AND 2-TON SIZES

**Independent Motors Co., Port Huron, Mich.**

SPECIALIZING on its two worm-driven models of ¾- and 2-ton capacity, the Independent company will also build its 1915 1½-ton chain-driven model on order. The ¾-ton worm-driver was new in 1915 but the 2-ton unit is brand new for 1916, the first delivery of which was made on January 1.

Both the worm-driven models are an assembled product which is offered for sale principally in the middle west. Each model follows the same general design which adheres closely to accepted truck engineering practice.

## Indiana

### FOUR WORM-DRIVEN TYPES, 1 TO 5 TONS

**Harwood-Barley Mfg. Co., Marion, Ind.**

FOUR NEW MODELS of worm-driven Indiana trucks, brought out during 1915, are continued for 1916 without change in addition to the four models of chain-driven trucks of the same capacity previously made. The latter will be sold on order only.

Each model follows the same general design which closely adheres to standard engineering truck practice. The Indiana truck is an assembled product which is sold nationally and abroad. Electric starting and lighting units are furnished on any model as extra equipment.

## Jeffery

### UNCHANGED FOUR-WHEEL-DRIVEN 2-TONNER

**Thomas B. Jeffery Co., Kenosha, Wis.**

CONTINUED without change and at the same price, the 2-ton Jeffery four-wheel-driven model is the one to be specialized upon for this year, the ¾- and 1½-ton units of last year having been discontinued. The 1916 2-tonner has its motor equipped with a Duplex governor instead of the old suction type formerly used.

The Jeffery truck is a manufactured product sold all over the United States and in seventeen foreign countries.

The vehicle is characterized by its four-wheel-drive, brake and steer, motor between the seats and steel disk wheels. Electric starting and lighting equipment is furnished as an extra. The majority of Jeffery trucks are sold as stripped chassis. They are guaranteed for use with trailers under favorable conditions.

## Kearns

### ONE 500- AND ONE 1,000-POUNDER

**Kearns Motor Truck Co., Beavertown, Pa.**

TWO brand new models, a 500-pounder and a ½-ton unit, are the Kearns offering for 1916. Both are bevel driven and have selective gearsets, whereas the former models of Kearns vehicles were double-chain driven and employed friction change-speed mechanisms. The previous models were also equipped with large wheels but these have been replaced by those of standard size in the new types.

Kearns trucks are an assembled product sold mostly in the east. The Kearns company does not maintain any selling branches but sells its vehicles direct to the user. Both models are equipped with electric starting and lighting units.

## Kelly-Springfield

### SEVEN MODELS FROM 1- TO 6-TON CAPACITY

**Kelly-Springfield Motor Truck Co., Springfield, O.**

SEVEN MODELS constitute the Kelly-Springfield line of 1916. It is the same as that of 1915 except that the capacity of last year's 2-tonner has been increased to 2½ tons. The models offered are of 1, 1½, 2½, 3½, 4, 5 and 6 tons capacity, all chain driven.

Kelly-Springfield trucks are a partly-assembled and partly-manufactured product which is sold throughout the United States and also abroad.

The trucks follow accepted engineering design and are characterized by French hoods. The Kelly-Springfield company prefers to sell its vehicles as stripped chassis but will equip them with bodies if desired. They are indorsed for use with trailers after the work to be done has been investigated by the company's engineers. Electric starting and lighting units are furnished as optional equipment.

## King

### ONE 3½-TONNER, CHAIN DRIVEN

**A. R. King Mfg. Co., Kingston, N. Y.**

CHARACTERIZED by its motor under the floor and double-chain drive, the King 3½-ton truck of 1916 differs from that of last year only in the price, which has been reduced $600. It is practically an assembled product which is sold

(Continued on page 58)

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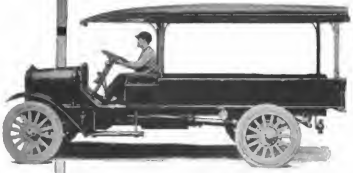
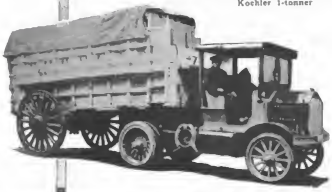


Above, a side view of the new Koehler 1-tonner

Above, a chassis plan view of the 1-ton Koehler showing unit power plant and internal-gear-driven rear axle



Above, the Pittsburgh-made Lange 2-tonner

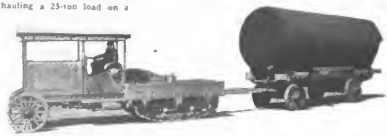
Above, the Koos tractor with heavy semi-trailer

Above, the Lippard-Stewart 1,500-pounder with panel body

Above, the Lambert 1-ton model

Above, the new Little Giant 1,500-pounder with worm-drive. Below, the Lombard creeper tractor hauling a 25-ton load on a four-wheeled trailer

Above, one of the 4-ton Locomobile worm-driven trucks which were brought out in 1915. Previous Locomobile trucks had their motors under the floors and chain drive



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# Introductory

FOR the fifth successive year THE COMMERCIAL VEHICLE publishes specifications of the principal makes of gasoline and electric commercial vehicles. Each year which has witnessed this aggregation of technical data has seen it more and more complete. For 1916 twenty-eight pages have been allotted to present this information to the readers of this publication. This is the first of these twenty-eight.

These specifications are prepared for the information of prospective buyers of motor trucks who require some means of ascertaining what vehicles are available, their capacities, types, their design and their prices. They are for the owner of motor trucks, whether at present in the market for new or additional equipment, or, if not, to aid him in keeping abreast of developments, so that when the time comes for further investment in commercial motor vehicles, he will be informed—will buy intelligently.

They are for the dealer in motor trucks of all types, in order that he may have a means of reference for the purpose

# Directory of 1916 Commercial Vehicles

## Names of 257 Makes of Gasoline, Steam, Electric and Electric Industrial Vehicles, Their Makers' Addresses and Sizes

| Name | Manufacturer | Address | MODELS IN TONS CAPACITY (Figures refer to capacity, not number of models) Under ½ | ½ | ¾ | 1 | 1½ | 2 | 2½ | 3 | 3½ | 4 | 5 | 5½ | 6 | 6½ | 7 and over |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gasoline Vehicles** | | | | | | | | | | | | | | | | | |
| A. & B. | American & British Mfg. Co. | Providence, R. I. | | | | | | | | 3 | | | 5 | | | | |
| A. & R. | Abendroth & Root Mfg. Co. | Newburgh, N. Y. | | | | | | | | 3 | | 4 | 5 | | | | |
| Acme | Cadillac Auto Truck Co. | Cadillac, Mich. | | | | | | 3 | | | | | | | | | |
| Adams | Adams Truck, Fdy. & Machine Co. | Findlay, Ohio | | | | 1 | 1½ | | 2½ | | | | | | | | |
| Acason | Acason Motor Truck Co. | Detroit, Mich. | | | | | | 2 | | | 3½ | | | | | | |
| Allis-Chalmers | Allis-Chalmers Mfg. Co. | Milwaukee, Wis. | | | | | | | | | | | 5 | | | | |
| Armleder | O. Armleder Co. | Cincinnati, Ohio | | | | | | 2 | 2½ | | 3½ | | | | | | |
| Atterbury | Atterbury Motor Car Co. | Buffalo, N. Y. | | | | | 1 | 2 | | | 3½ | | | | | | |
| Auglaize | Auglaize Motor Car Co. | New Bremen, Ohio | | | | 1 | | | | | | | | | | | |
| Autocar | Autocar Co. | Ardmore, Pa. | | | | | 1½ | 2 | | | | | | | | | |
| Available | Available Truck Co. | Chicago, Ill. | | | | 1 | | 2 | | | 3½ | | | | | | |
| Avery | Avery Co. | Peoria, Ill. | | | | 1 | | 2 | | 3 | | | 5 | | | | |
| Barker | C. L. Barker | Norwalk, Conn. | | | | 1 | | 2 | | | | | | | | | |
| Bauer | Bauer Machine Wks. Co. | Kansas City, Mo. | | 1 | 2 | | | | | | | | | | | | |
| Beach Creek | Beach Creek Truck & Auto Co. | Beach Creek, Pa. | | | | | | | | 3 | | | | | | | |
| Bell | Bell Motor Car Co. | York, Pa. | | 1 | | | | | | | | | | | | | |
| Bessemer | Bessemer Motor Truck Co. | Grove City, Pa. | | | 2 | | 1½ | 2 | | | 3½ | | | | | | |
| Blair | Blair Motor Truck Co. | Newark, Ohio | | | | | | 2 | | 3 | | 4 | 5 | | | | |
| Board | R. F. Board Motor Truck Co. | Alexandria, Va. | | | | | | | | | | | | | | | |
| Bellstream | Bellstream Products Sales Co. | Battle Creek, Mich. | | | 2 | | | | | | | | | | | | |
| Brasie | Brasie Motor Truck Co. | Minneapolis, Minn. | 1 | | | | | | | | | | | | | | |
| Brennan | Brennan Mfg. Co. | Syracuse, N. Y. | | | | | | | | | | | | | | | |
| Brinton | Chester County Motor Co. | Coatesville, Pa. | | | | | | | 2½ | | | | | | | | |
| Briscoe | Briscoe Motor Co. | Jackson, Mich. | | | | | | | | | | | | | | | |
| Brockway | Brockway Motor Wagon Co. | Cortland, N. Y. | | | | | 1½ | 2 | | | | | | | | | |
| Bucklen | H. E. Bucklen, Jr., Motor Truck Co. | Elkhart, Ind. | | | | | 1½ | | 2½ | | | | | | | | |
| Buick | Buick Motor Co. | Flint, Mich. | | | | | | | | | | | | | | | |
| Burford | B. G. Burford Co. | Fremont, Ohio | | | | | | 2 | | | 3½ | | | | | | |
| Carlton | Carlton-Hill Motor Car Co. | Rutherford, N. J. | | | | | | | | | | | | | | | |
| Carroll | Carroll Motor Car Co. | Stroudsburg, Pa. | | | | | | | | | | | | | | | |
| Casey | E. A. Casey | Billerica, Mass. | 1 | | | | | | | | | | | | | | |
| Chase | Chase Motor Truck Co. | Syracuse, N. Y. | | | | 1 | | 2 | | | 3½ | | | | | | |
| Coleman | Coleman Carriage & Harness Co. | Ilion, N. Y. | | | | | | 2 | | 3 | | | | | | | |
| Columbia | Columbia Motor Truck & Trailer Co. | Pontiac, Mich. | | | | | | 2 | | | | | | | | | |
| Commerce | Commerce Motor Car Co. | Detroit, Mich. | | 1 | | | | | | | | | | | | | |
| C. T. | Commercial Truck Co. of America | Philadelphia, Pa. | | | | | | | | | 3½ | | 5 | | | | T |
| Continental (C | Continental Motor Truck Co. | Chicago, Ill. | | | | 1 | 1½ | 2 | | | 3½ | | | | | | |
| Continental (S | Continental Truck Mfg. Co. | Superior, Wis. | | | | | 1½ | | | 3 | | | | | | | |
| Corbitt | Corbitt Automobile Co. | Henderson, N. C. | | | | 1 | | 2 | | | | | | | | | |
| Couple-Gear | Couple-Gear Freight Wheel Co. | Grand Rapids, Mich. | | | | | | | | | 3½ | | 5 | | | | |
| Crawford | Crawford Automobile Co. | Hagerstown, Md. | | | | | | | | 3 | | | | | | | |
| Cross | Cross Automobile Co. | Asbury Park, N. J. | | | | | 1½ | | 2½ | | | | | | | | |
| Crowther | Crowther Motor Co. | Philadelphia, Pa. | | | | | | | 2½ | | | | | | | | |
| Crown | Crown Commercial Car Co. | N. Milwaukee, Wis. | | | | 1 | 1½ | | | | | | | | | | |
| Curtis | Pittsburgh Machine Tool Co. | Braddock, Pa. | | | | | | 2 | | 3 | | | | | | | |
| Dain | Dain Mfg. Co. | Ottumwa, Iowa | | | | 1 | | | | | | | | | | | |
| Dart | Dart Motor Truck Co. | Waterloo, Iowa | | | | 1 | | 2 | 2½ | | | | | | | | |
| Davton | Dayton Dayton Truck Co. | Dayton, Ohio | | | | | | 2 | | | 3½ | | 5 | | | | 7½ |
| DeKalb | DeKalb Wagon Wks. | DeKalb, Ill. | | | | | 1½ | | 2½ | | | | | | | | |
| Denby | Denby Motor Truck Co. | Detroit, Mich. | | 1 | 1 | 1½ | 2 | | | | | | | | | | |
| Detroit | Detroit Commercial Car Co. | Pontiac, Mich. | 1 | | | | | | | | | | | | | | |
| Diamond-T | Diamond-T Motor Car Co. | Chicago, Ill. | | 1 | | 1½ | 2 | | | | 3½ | | | | | | |
| Dispatch | Dispatch Motor Car Co. | Minneapolis, Minn. | 1 | | | | | | | | | | | | | | |
| Deane | Deane Motor Truck Co. | San Francisco, Cal. | | | | | | | | | | | | 6 | | | |
| Dorris | Dorris Motor Car Co. | St. Louis, Mo. | | 1 | | | | 2 | | | | | | | | | |
| Duffy | Duffy Bros. Motor Truck Co. | San Francisco, Cal. | | | | | | | | | | | | | | | |
| Duplex | Duplex Power Car Co. | Charlotte, Mich. | | | | | | 2 | | 3 | | | | | | | |

Heavy type represents vehicles whose specifications are given in this issue.

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of determining the capacities, prices and construction of competing makes, so that in case he wishes to change his line or add vehicles of another make or type to his stock, he may be sure that he has not overlooked any of the recognized makes It enables him to obtain an accurate focus on the relation of his line to motor trucks in general.

They are intended for the manufacturer, for the engineer, for the sales executive and others of the producing organization who often have urgent need for a reliable and complete reference to standard products in their line.

Besides this, the industry requires some standard reference for a vast amount of data, the need for all of which cannot always be foreseen in advance.

Therefore, for 1916, THE COMMERCIAL VEHICLE is able to present a directory of 257 makes of vehicles, with the makers' names, their addresses, and the capacities of their products; a condensed buyers' guide of the principal makes, grouped according to the tons capacity and segregated according to form of power; a table of specifications covering 408 different gasoline chassis models of 150 manufacturers; specifications and a buyers' guide of seventy-nine electric vehicles, of both the commercial and industrial types, together with complete glossaries of terms for both gasoline and electric specification tables and a table of electric industrial truck details in addition to the technical specifications.

# Directory of 1916 Commercial Vehicles

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| Name | Manufacturer | Address | MODELS IN TONS CAPACITY *Figures refer to capacity, not number of models* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Under ½ | ½ | 1 | 1½ | 2 | 2½ | 3 | 3½ | 4 | 5 | 5½ | 6 | 6½ | 7 and over |
| **Gasoline Vehicles** | | | | | | | | | | | | | | | | |
| Duncar | Amalgamated Motors Corp. | Alhambra, Cal. | | ½ | | 1 | | | | | | | | | | |
| Duryea | Duryea Laboratories | Philadelphia, Pa. | | ½ | | | | | | | | | | | | |
| Dominion Tractor | Dominion Motor Truck Co. | Detroit, Mich. | | | | | | | | | | | | 6 | | 7 |
| Eastern | Eastern Power Truck Co. | Providence, R. I. | | | | | | | | | | | | | | |
| Elbert | Elbert Motor Car Co. | Tacoma, Wash. | | | | | | | | | | | | | | |
| Elmira | Elmira Commercial Car Co. | Elmira, N. Y. | | | | | | | | | | | | | | |
| Erie | Erie Motor Truck Mfg. Co. | Erie, Pa. | | | | | | | | | | | | | | |
| Falcon | Falcon Motor Truck Co. | Detroit, Mich. | | ½ | | | | | | | | | | | | |
| Farge | Farge Motor Car Co. | Chicago, Ill. | | | 1 | | 2 | | | | | | | | | |
| Fawick | Fawick Motor Car Co. | Sioux Falls, S. D. | | ½ | ½ | | 2 | | | | | | | | | |
| Federal | Federal Motor Truck Co. | Detroit, Mich. | | | | 1½ | | | | 3½ | | | | | | |
| Forschler | Phillip Forschler Wagon Co. | New Orleans, La. | | | | 1½ | | | | | | | | | | |
| F. W. D. | Four Wheel Drive Auto Co. | Clintonville, Wis. | | | | 1½ | | | 3 | | | 5 | | | | |
| Franklin | Franklin Commercial Truck Co. | Franklin, Pa. | | | | | | | | | | | | | | |
| Gabriel | Gabriel Auto Co. | Cleveland, Ohio | | | 1 | 1½ | | | | | | | | | | |
| Garford | Garford Motor Truck Co. | Lima, Ohio | | | 1 | 1½ | 2 | | | | | 5 | | 6 | | |
| Gary | Gary Motor Truck Co. | Gary, Ind. | | | 1 | 1½ | 2 | | | | | | | | | |
| G. A. Schacht | G. A. Schacht Motor Truck Co. | Cincinnati, Ohio | | | | | 2 | | 3 | | | | | | | |
| Gay | S. G. Gay Co. | Ottawa, Ill. | | | | | | | | | | | | | | |
| Geneva | Geneva Wagon Co. | Geneva, N. Y. | | | ½ | | | | | | | | | | | |
| Gersix | Gerlinger Motor Car Co. | Portland, Ore. | ½ | | | | | | | | | | | | | |
| Globe | Globe Furniture Co. | Northville, Mich. | | | | | | | | | | | | | | |
| G.M.C. | General Motors Truck Co. | Pontiac, Mich. | | ½ | 1½ | 1½ | 2 | | | 3½ | | 5 | | | | |
| Grasso-Bernstein | Grasso-Bernstein Co. | Lima, Ohio | | | 1 | 1½ | | 2½ | | 3½ | | | | 6 | | |
| Great Southern | Great Southern Automobile Co. | Birmingham, Ala. | | | | | 2 | | | | 4 | | | | | |
| G.V.-Mercedes | General Vehicle Co. | Long Island City, N. Y. | | | | | | | | | | | | 6 | | |
| Hahn | Hahn Motor Truck Co. | Hamburg, Pa. | | | | | | | | | | | | | | |
| Hall | Lewis-Hall Iron Works | Detroit, Mich. | | | | | | | | 3½ | | 5 | | | | |
| Handy Wagon | Auburn Motor Chassis Co. | Auburn, Ind. | ½ | | | | | | | | | | | | | |
| Hanger | C. F. Hanger Co. | Cleveland, Ohio | | | | | | | | | | | | | | |
| Harrison | Robert Harrison Co. | So. Boston, Mass. | | | | | | | | | | | | | | |
| Harvey | Harvey Motor Truck Co. | Harvey, Ill. | | | | | | | | 3½ | | 5 | | | | |
| Henderson | Henderson Bros. | North Cambridge, Mass. | | ½ | | 1 | | | | | | | | | | |
| Hercules | Hercules Motor Truck Co. | So. Boston, Mass. | | | | | | | | | | | | | | |
| Headley | Headley Bros. | Seaport, Ind. | | | | | 2 | | | | | | | | | |
| Horner | Detroit-Wyandotte Motor Co. | Wyandotte, Mich. | | | | 1½ | 2 | | 3 | | | 5 | | | | |
| Houghton | Houghton Spike Co. | Marion, Ohio | | | 1 | | | | | | | | | | | |
| Howard | R. G. Howard | Boston, Mass. | | 1 | | | | | | | | | | | | |
| Hurlburt | Hurlburt Motor Truck Co. | New York City | | | 1 | | 2 | | | 3½ | | | | | | |
| Hannibal | Hannibal Motor Car Co. | Hannibal, Mo. | ½ | | | | | | | | | | | | | |
| I. H. C. | International Harvester Corp. | Akron, Ohio | ½ | | 1 | | | | | | | | | | | |
| Independent | Independent Motors Corp. | Port Huron, Mich. | | | | | 2 | | | | | | | | | |
| Indiana | Harvey-Harley Mfg. Co. | Marion, Ind. | | | 1 | 1½ | | | 3 | | | 5 | | | | |
| Iowa | Iowa Motor Truck Co. | Ottumwa, Iowa | | | 1 | 1½ | | | | | | | | | | |
| Jeffery | Thomas B. Jeffery Co. | Kenosha, Wis. | | | | | 2 | | | | | | | | | |
| Kanawha | Kanawha Auto Truck Co. | Charleston, W. Va. | | | | | | | | | | | | | | |
| Kearns | Kearns Motor Car Co. | Beaverstown, Pa. | ½ | ½ | | | | | | | | | | | | |
| Kelly-Springfield | Kelly-Springfield Motor Truck Co. | Springfield, Ohio | | | 1 | 1½ | 2 | | 3 | | 4 | 5 | | 6 | | |
| King | A. H. King Mfg. Co. | Kingston, N. Y. | | | | | | | | 3½ | | | | | | |
| Kissel-kar | Kissel Motor Car Co. | Hartford, Wis. | | ½ | | 1 | 2 | | 3 | | 4 | | | 6 | | |
| Kleiber | Kleiber Co., Inc. | San Francisco, Cal. | | | | 1½ | | 2½ | | 3½ | | 5 | | | | |
| Knickerbocker | Knickerbocker Motor Truck Co. | New York City | | | | | 2 | | | 3½ | | | | | | |
| Knox Tractor | Knox Motors Ancorites | Springfield, Mass. | | | | | | | | | | | | | | T |

Heavy type represents vehicles whose specifications are given in this issue.

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# Two Hundred Twenty-one Gasoline Commercial Vehicle Makes

| Name | Manufacturer | Address | Number of models | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Under ½ | ½ | 1 | 1½ | 2 | 2½ | 3 | 3½ | 4 | 5 | 5½ | 6 | 6½ | 7 and over |
| **Koehler** | H. J. Koehler S. O. Co. | Newark, N. J. | | | 1 | | | | | | | | | | | |
| **Kopp** | Kopp Motor Truck Co. | Buffalo, N. Y. | | | | 1½ | | | 3 | | | 5 | | | | |
| **Kosmath** | Kosmath Co. | Detroit, Mich. | | 4 | | | | | | | | | | | | |
| **Krebs** | Krebs Commercial Car Co. | Clyde, Ohio | | 2 | 1 | | 2 | | 3 | | | | | | | |
| **Lambert** | Berkeley Mfg. Co. | Anderson, Ind. | | 4 | 1 | | 2 | | | | | | | | | |
| **Landshaft** | William Landshaft & Son | Chicago, Ill. | | | 1 | | 2 | | | | | | | | | |
| **Lange** | Lange Motor Truck Co. | Pittsburgh, Pa. | | | 1 | | 2 | | | | | | | | | |
| **Lazrabee** | Lazrabee-Depew Motor Truck Co. | Binghamton, N. Y. | | | | 1½ | | 2½ | | | | | | | | |
| **Lenox** | Lenox Motor Car Co. | Boston, Mass. | | | | | | | | | | | | | | |
| **Lima** | Lima Light Car Mfg. Co. | Lima, Ohio | 4 | | | | | | | | | | | | | |
| **Lippard-Stewart** | Lippard-Stewart Motor Car Co. | Buffalo, N. Y. | 4 | | 1 | 1½ | 2 | | | | | | | | | |
| **Little Giant** | Chicago Pneumatic Tool Co. | Chicago, Ill. | | | | 1½ | 2 | | | | | | | | | |
| **Lincoln** | Lincoln Motor Truck Co. | Detroit, Mich. | | | | | | | | | | | | | | |
| **Locomobile** | Locomobile Co. of America | Bridgeport, Conn. | | | | | | | 3 | | 4 | | | | | |
| **Lord Baltimore** | Lord Baltimore Motor Truck Co. | Baltimore, Md. | | | 1 | | 2 | | | | | | | | | |
| **Lombard** | Lombard Auto Tractor-Truck Corp. | New York City | | | | | | | | | | 5 | | | | |
| **Maccar** | Maccar Co. | Scranton, Pa. | | | 1 | | 2 | | | 3½ | | | | | | |
| **Mack** | International Motor Co. | New York City | | | 1 | 1½ | 2 | | | 3½ | | | 5½ | | | 7½ T |
| **Maia** | Maia Motor Truck Co. | Indianapolis, Ind. | | | | 1½ | 2 | | 3 | | 4 | | | | | |
| **Martin** | Martin Carriage Wks. | York, Pa. | | | 1 | | 2 | 2½ | | | 4 | | | | | |
| **Mesaninoff** | D. F. Poyer Co. | Mesaninoff, Mich. | | 4 | 1½ | | 2 | | | | | | | | | |
| **Mercury** | Mercury Mfg. Co. | Chicago, Ill. | 4 | | | | | | | | | | | | | |
| **Mercury-Bulley Tractor** | Mercury Mfg. Co. | Chicago, Ill. | | | | | | | | | | | | | | T |
| **Meta** | Meta Co. | Waltham, Mass. | | 4 | | | | | | | | | | | | |
| **Modern** | Bowling Green Motor Car Co. | Bowling Green, Ohio | | | 1 | 1½ | 2 | | | 3½ | | | | | | |
| **Mogul** | Mogul Motor Truck Co. | St. Louis, Mo. | | | | 1½ | 2 | 2½ | | 3½ | | | | | | |
| **Monitor** | Monitor Automobile Wks. | Janesville, Wis. | 4 | | 1 | | | | | | | | | | | |
| **Moon** | Joseph W. Moon Buggy Co. | St. Louis, Mo. | | | | 1½ | | | | | | | | | | |
| **Moore** | Pacific Metal Products Co. | Torrance, Cal. | | | | | | 2½ | | | | 5 | | | | |
| **Moreland** | Moreland Motor Truck Co. | Los Angeles, Cal. | | | 4 | 1½ | | 2½ | | | 4 | | | | | |
| **Morton** | Morton Truck & Tractor Co. | Harrisburg, Pa. | | | | | | 2 | | | | | | | | |
| **Mohawk** | Mohawk Motor Truck Co. | Ravenna, Ohio | | | | | | | | | | | | | | |
| **Nafco** | National Motor Truck Co. | Bay City, Mich. | | | 1 | | | | | | | | | | | |
| **Nelson & LeMoon** | Nelson & LeMoon | Chicago, Ill. | | | 1 | | 2 | | 3 | | | | | | | |
| **Notco** | New England Truck Co. | Fitchburg, Mass. | | | | 1½ | 2 | | | | | | | | | |
| **Nevada** | Nevada Mfg. Co. | Nevada, Iowa | | | | | | | 3 | | | | | | | |
| **New York** | Fageimeier & Reipe | New York City | | | | 1½ | | | | | | | | | | |
| **O. K.** | O. K. Motor Truck Co. | Detroit, Mich. | | | 1½ | | | | | | | | | | | |
| **Old Hickory** | Kentucky Wagon Mfg. Co. | Louisville, Ky. | | | 1½ | | | | | | | | | | | |
| **Old Reliable** | Old Reliable Motor Truck Co. | Chicago, Ill. | | | | 4 | 2 | | | | 4 | 5 | | 6 | | |
| **Overland** | Willys-Overland Co. | Toledo, Ohio | 4 | | | | | | | | | | | | | |
| **Packard** | Packard Motor Car Co. | Detroit, Mich. | | | 1 | 4 | 2 | | 3 | | 4 | | | | | |
| **Palmer** | Palmer-Meyer Motor Car Co. | St. Louis, Mo. | | | 1 | | 2 | | | | | | | | | |
| **Palmer-Moore** | Palmer-Moore Co. | Syracuse, N. Y. | | | 1½ | | | | | | | | | | | |
| **Paulding** | St. Louis Motor Truck Co. | St. Louis, Mo. | | | 1 | 1½ | 2 | | | | | | | | | |
| **Peerless** | Peerless Motor Car Co. | Cleveland, Ohio | | | | | 2 | | 3 | | 4 | 5 | | 6 | | |
| **Phoenix Centiped** | Phoenix Mfg. Co. | Eau Claire, Wis. | | | | | | | | | | | | | | |
| **Pierce-Arrow** | Pierce-Arrow Motor Car Co. | Buffalo, N. Y. | | | | | 2 | | | | | 5 | | | | |
| **Piercy** | Hub Motor Truck Co. | Columbus, Ohio | | | | | | 2½ | | | | | | | | |
| **Reo** | Reo Motor Truck Co. | Lansing, Mich. | | | | | 2 | | | | | | | | | |
| **Republic** | Republic Motor Truck Co. | Alma, Mich. | | | 1 | | 2 | | 3 | | | | | | | |
| **Rickenson** | Golden West Motors Co. | Sacramento, Cal. | | | | | 2 | | | | | | | | | |
| **Rockford** | Rockford Motor Truck Co. | Rockford, Ill. | | | | | 2 | | | | | | | | | |
| **Rowe** | Rowe Motor Co. | Downingtown, Pa. | | | 1 | | 2 | | 3 | | | 5 | | | | |
| **Royal** | Royal Motor Truck Co. | New York City | | | | | | | | 3½ | | 5 | | 6 | | |
| **R-S** | Reading-Standard Co. | Reading, Pa. | 4 | | | | | | | | | | | | | |
| **Salvador** | Mansur Motor Truck Co. | Haverhill, Mass. | | | | | 2 | | | | | | | | | |
| **Sandow** | Sandow Truck Co. | Chicago, Ill. | | | | 1½ | 2 | | 3 | | | | | | | |
| **Sanford** | Sanford Motor Truck Co. | Syracuse, N. Y. | | 4 | 1 | | 2 | | | | | | | | | |
| **Saurer** | International Motor Co. | New York City | | | | | | | | | | 5 | | | 6½ | |
| **Saxon** | Saxon Motor Co. | Detroit, Mich. | 4 | | | | | | | | | | | | | |
| **Schlueter** | Schlueter Motor Vehicle Co. | New York City | | | | | 2 | | 3 | | | 5 | | | | |
| **Seldon** | Seldon Motor Vehicle Co. | Rochester, N. Y. | | | 1 | | 2 | | | 3½ | | | | | | |
| **Service** | Service Motor Truck Co. | Wabash, Ind. | | | 1 | 1½ | 2 | | | 3½ | | 5 | | | | |
| **Seubert** | Seubert Motor Truck Co. | Toledo, Ohio | | 4 | | | | | | | | | | | | |
| **Signal** | Signal Motor Truck Co. | Detroit, Mich. | | | 1 | 1½ | 2 | | | 3½ | | | | | | |
| **Sphinx** | Sphinx Motor Car Co. | York, Pa. | 4 | | | | | | | | | | | | | |
| **South Bend** | South Bend Motor Car Wks. | South Bend, Ind. | | 4 | | 1½ | 2 | | | 3½ | | | | | | |
| **Standard** | Standard Motor Truck Co. | Detroit, Mich. | | | | | 2 | | | 3½ | 4 | 5 | | 6 | | 10 |
| **Standard Tractor** | Standard Tractor Co. | Brooklyn, N. Y. | | | | | | | | | | | | | | |
| **Stearns** | F. B. Stearns Co. | Cleveland, Ohio | | | | | | | | | | 5 | | | | |
| **Steele** | B. M. Steele | Worcester, Mass. | | | | | 2 | | 3 | | 4 | 5 | | | | |
| **Stegeman** | Stegeman Motor Car Co. | Milwaukee, Wis. | | | | 1½ | | 2½ | | 3½ | | | | | | |
| **Sterling** | Sterling Motor Truck Co. | Milwaukee, Wis. | | | | | 2 | | | 3½ | | 5 | | | | 7 |
| **Stewart (B** | Stewart Motor Corp. | Buffalo, N. Y. | | | 1½ | | | | | | | | | | | |
| **Stewart (C** | Stewart Iron Wks. | Covington, Ky. | | | 1 | | | | | | | | | | | |
| **Studebaker** | Studebaker Corp. | Detroit, Mich. | | 4 | 1 | | | | | | | | | | | |
| **Sullivan** | Sullivan Motor Car Co. | Rochester, N. Y. | | | | 1½ | 2 | | | | | | | | | |
| **Superior** | F. G. Willingham's Sons | Atlanta, Ga. | | | | | 2 | | | | | | | | | |
| **Tiffin** | Tiffin Wagon Co. | Tiffin, Ohio | | 4 | 1 | 1½ | 2 | | | | | 5 | | 6 | | |
| **Torpedo** | Torpedo Bros. | Bay City, Mich. | | | | | | | | | | | | | | |
| **Toledo** | Toledo Motor Truck Co. | Toledo, Ohio | | | | | 2 | | | | | | | | | |
| **Tower** | Tower Motor Truck Co. | Greenville, Mich. | | | | | 2 | | | | | | | | | |
| **Trahold** | Trahold Motor Mfg. Co. | Johnstown, Pa. | | | 1 | | 2 | | 3 | | | | | | | |
| **Transit** | Transit Motor Car Co. | Louisville, Ky. | | | 1 | | 2 | | | 3½ | | 5 | | | | |
| **Transport Tractor** | Transport Tractor Co. | Long Island City, N. Y. | | | | | | | | | | 5 | | | | T |
| **Trumbull** | Trumbull Motor Car Co. | Bridgeport, Conn. | 4 | | | | | | | | | | | | | |
| **Twin City** | Brame Motor Car Co. | Minneapolis, Minn. | | | 1 | | 2 | | | | | | | | | |
| **Tulsa** | Tulsa Automobile & Mfg. Co. | Tulsa, Okla. | | | | | | | | | | | | | | |

Heavy type represents vehicles whose specifications are given in this issue.

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# Two Steamers, 24 Electrics and Ten Industrial Electrics

| Name | Manufacturer | Address | MODELS IN TONS CAPACITY (Figures refer to capacity, not number of models) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Under ½ | ½ | ¾ | 1 | 1½ | 2 | 2½ | 3 | 3½ | 4 | 5 | 5½ | 6 | 6½ | 7 and over |
| Universal | Universal Service Co. | Detroit, Mich. | | | | | 1½ | 2 | | 3 | | | | | | | |
| United | United Motor Truck Co. | Grand Rapids, Mich. | | | | | 1½ | 2 | | | 3½ | | 5 | | | | |
| U. S. | United States Motor Truck Co. | Cincinnati, Ohio | | | | | | 2 | | | 3½ | | 5 | | | | |
| Van Winkle | Van Winkle Motor Truck Co. | Atlanta, Ga. | | | | | | | | | | | | | | | |
| Velie | Velie Motor Vehicle Co. | Moline, Ill. | | | | | 1½ | | | | 3½ | | | | | | |
| Vim | Vim Motor Truck Co. | Philadelphia, Pa. | | ½ | | | | | | 2 | | | 5 | | | | |
| Volta | Volta Bros. | Chicago, Ill. | | | | | | | | 3 | | | 5 | | | | |
| Vulcan | Drage-Seabury Ordnance Co. | Sharon, Pa. | | | | | | 2 | | 3 | | | 5 | | | | |
| Walter | Walter Motor Truck Co. | New York City | | | | | | | | | | | 5 | | 6 | | 7½-12 |
| Watson | Watson Wagon Co. | Canastota, N. Y. | | | | | | | | | | | 5 | | | | |
| Ware | Twin City Four Wheel Drive Co. | St. Paul, Minn. | | | | | | | | 3 | | | | | | | |
| Warren | Warren Motor Truck Co. | Warren, Ohio | | | | | | | | | | | | | | | |
| Washington | Washington Motor Car Co. | Hyattsville, Md. | | | | | | | | | | | 5 | | 6 | | 7 |
| Wear-Smith | Wear-Smith Truck Co. | Birmingham, Mich. | | | | | 1½ | | | | | | | | | | |
| West Coast | West Coast Wagon Co. | Tacoma, Wash. | | | | | | | | | | | | | | | |
| White | White Co. | Cleveland, Ohio | | | 2 | | 1½ | | | 3 | | | 5 | | | | |
| Wichita | Wichita Falls Motor Co. | Wichita Falls, Texas | | | | 1 | 1½ | 2 | | | 3½ | | | | | | |
| Wilcox | H. E. Wilcox Motor Co. | Minneapolis, Minn. | | ½ | 2 | 1 | 1½ | | | | | | | | | | |
| Wilson | J. C. Wilson Co. | Detroit, Mich. | | | | | | 2 | | | | | | | | | |
| Wisconsin | Myers Machine Co. | Sheboygan, Wis. | | | 2 | 1 | | 2 | | | | | | | | | |
| Witt-Will | Witt-Will Co. | Washington, D. C. | | | | 1 | 1½ | | | | | | | | | | |
| Woods Mobilette | Woods Mobilette Co. | Chicago, Ill. | ½ | | | | | | | | | | | | | | |
| Zimmerman | Zimmerman Mfg. Co. | Auburn, Ind. | | ½ | | | | | | | | | | | | | |

## Steam Vehicles

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stanley** | **Stanley Motor Carriage Co.** | **Newton, Mass.** | | | 2 | 1½ | | | | | | | | | | | |
| **Titan** | **Titan Motor Car Co.** | **Newark, Del.** | | | | | | | | | | | | | | | |

## Electric Vehicles

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Argo | American Electric Car Co. | Saginaw, Mich. | | ½ | | 1 | | | | | | | | | | | |
| Andover | Andover Motor Vehicle Co. | Andover, Mass. | | | | | 1½ | | | | | | | | | | |
| Atlantic | Atlantic Vehicle Co. | Newark, N. J. | | ½ | | 1 | | 2 | | | 3½ | | 5 | | | | |
| **Baker** | Baker-B. & L. Co. | Cleveland, Ohio | | | | 1 | | 2 | | | 3½ | | 5 | | | | |
| Beaver | Beaver State Motor Co. | Gresham, Ore. | | | | | | | | | | | | | | | |
| Buffalo | Buffalo Electric Vehicle Co. | Buffalo, N. Y. | | | | 1 | | | | | | | | | | | |
| Capitol | Capitol Truck Mfg. Co. | Denver, Col. | | | | | | | | | | | | | | | |
| Carl | Carl Electric Vehicle Co. | Toledo, Ohio | | | | | | | | | | | | | | | |
| **Connersville** | Connersville Buggy Co. | Connersville, Ind. | ½ | | | | | | | | | | | | | | |
| **Couple-Gear** | Couple-Gear Freight Wheel Co. | Grand Rapids, Mich. | | | | | | 2 | | | 3½ | | 5 | | 6 | | |
| **C. T.** | Commercial Truck Co. | Philadelphia, Pa. | | ½ | | 1 | | 2 | | | | | 5 | | | | |
| Dayton | Dayton Electric Car Co. | Dayton, Ohio | | | | | | | | | | | | | | | |
| Field | Field Omnibus Co. | New York City | 1⅛ to 3⅛ passenger buses | | | | | | | | | | | | | | |
| Fritchle | Fritchle Automobile & Battery Co. | Denver, Col. | | ½ | | | | | | | | | | | | | |
| **G.M.C.** | General Motors Truck Co. | Pontiac, Mich. | | ½ | | 1 | 1½ | 2 | | | 3½ | | | 5 | 6 | | |
| **G.V.** | General Vehicle Co. | Long Island City, N. Y. | | ½ | | 1 | | 2 | | | 3½ | | | 5 | | | |
| **Lansden** | Lansden Co., Ltd. | Brooklyn, N. Y. | ½ | ½ | | 1 | | 2 | | | 3½ | | | 5 | | | 7 |
| Old Hickory | Kentucky Wagon Mfg. Co. | Louisville, Ky. | | | | 1 | | | | | | | | | | | |
| Storms | Storms Electric Co. | Detroit, Mich. | ½ | | | | | | | | | | | | | | |
| Urban | Kentucky Wagon Mfg. Co. | Louisville, Ky. | | | 2 | | 1½ | | 2½ | | | | 4 | | | | |
| Voltamar | Cyro-Lectric Car Co. | New York City | ½ | | | | | | | | | | | | | | |
| **Walker** | Walker Vehicle Co. | Chicago, Ill. | | ½ | | 1 | | 2 | | 3 | | 4 | 5 | | | | 7 |
| **Ward** | Ward Motor Vehicle Co. | Mount Vernon, N. Y. | ½ | ½ | | 1 | | 2 | | | 3½ | | 5 | | | | |
| **Waverley** | Waverley Co. | Indianapolis, Ind. | | ½ | | 1 | | 2 | | | 3½ | | 5 | | | | |

## Electric Industrial Vehicles

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Automatic** | **Automatic Transportation Co.** | **Buffalo, N. Y.** | | | | 1 | | 2 | | | | | | | | | |
| **Buda** | **Buda Co.** | **Chicago, Ill.** | | | | | | 2 | | | | | | | | | 7 |
| **Cowan** | **Cowan Truck Co.** | **Holyoke, Mass.** | | | | | | 2 | | | | | | | | | |
| **Dynamic** | **Galion-Dynamic Motor Truck Co.** | **Galion, Ohio** | | | | | | 2 | | | | | | | | | 7 |
| **Electromobile** | **Orenstein-Arthur Koppel Co.** | **Koppel, Pa.** | | | | | 1½ | 2 | | | | | | | | | 7 |
| **Elwell-Parker** | **Elwell-Parker Electric Co.** | **Cleveland, Ohio** | | | | | | | | | | | | | | | |
| **G. V.** | **General Vehicle Co.** | **Long Island City, N. Y.** | | | | 1 | | | | | | | | | | | |
| **Hoagland-Thayer** | **Hoagland-Thayer, Inc.** | **Newark, N. J.** | | | | | | 2 | | | | | | | | | 7 |
| **Hunt** | **C. W. Hunt Co.** | **West New Brighton, N. Y.** | | | | | 1½ | 2 | | | | | | | | | |
| **Mercury** | **Mercury Mfg. Co.** | **Chicago, Ill.** | | | | | | | | | | | | | | | 7 |

Heavy type represents vehicles whose specifications are given in this issue.

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# Buyers' Guide to 1916 Gasoline Trucks

Salient Features of Chassis, Classified According to Capacity

## TRUCKS UNDER ½-TON CAPACITY

| Name and Model | | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|---|
| Brasie | Pocket | 500 | $450-c | 100 | pneu | 12.08 | fric | dbl chn |
| Kearns | L | 500 | 375 | 90 | pneu | 12.08 | selec | bevel |
| Overland | 83 | 800 | 750-c | 106 | pneu | 27.20 | selec | bevel |
| R-S | | 350 | 305 | 65 | pneu | 9.12 | prog | sing chn |
| Saxon | | 400 | 395 | 96 | pneu | 12.08 | prog | bevel |
| Trumbull | 16D | 500 | 360 | 80* | pneu | 13.37 | selec | bevel |

## TRUCKS OF ½-TON CAPACITY

| Name and Model | | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|---|
| Bauer | A | 1,000 | 720 | 100 | solid* | 22.50 | selec | double-red |
| Brinton | H | 1,200 | 815 | 98 | cush* | 16.92 | selec | top worm |
| Croco | 10 | 1,000 | 800 | 104 | pneu | 19.92 | selec | bevel |
| Crowther | 16-30 | 1,000 | 600 | 110 | pneu | 22.50 | rollers | rollers |
| Detroit | B | 1,000 | | 112 | pneu | 22.50 | selec | bevel |
| Dispatch | L | 1,200 | 900 | 120 | pneu | 22.50 | fric | dbl chn |
| Durant | L | 1,000 | 600 | 84 | solid | | rollers | rollers |
| Falcon | A | 1,000 | 715 | 106 | pneu | 14.40 | selec | bevel |
| Hanger | B | 1,000 | 875 | 110* | pneu | 16.92 | selec | top worm |
| Henderson | C | 1,200 | 1,100 | 106* | pneu | 19.61 | selec | top worm |
| Hannibal | A | 1,000 | 550 | 106 | pneu | 16.92 | selec | |
| I.H.C. | MA | 1,000 | 600-c | 90 | solid* | 20.00 | ind-e | dbl chn |
| I.H.C. | MW | 1,000 | 710-c | 90 | solid* | 16.20 | ind-e | dbl chn |
| Kearns | D | 1,000 | 600 | 107 | pneu | 16.92 | selec | bevel |
| Kissel-kar | | 1,000 | 950 | 115 | pneu | 24.22 | selec | bevel |
| Kosmath | 15 | 1,000 | 675 | 100 | pneu | 15.65 | selec | bevel |
| Lambert | VI | 1,000 | 900 | 106* | pneu | 19.61 | fric | dbl chn |
| Lippard-Stewart | M | 1,000 | 1,000 | 106 | pneu | 14.40 | selec | top worm |
| Mercury | P | 1,000 | 650 | 85 | solid | 14.50 | plan | dbl chn |
| Studebaker | SF | 1,000 | 785 | 112 | pneu | 24.22 | selec | bevel |
| Vim | 18 | 1,000 | 620 | 100 | pneu | 14.40 | selec | bevel |
| Wilcox | T | 1,000 | 1,000 | 115 | pneu | 19.61 | selec | bevel |

## TRUCKS OF ¾-TON CAPACITY

| Name and Model | | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|---|
| Bauer | B | 1,500 | 840 | 110 | solid* | 22.50 | selec | double-red |
| Bensinger | G | 1,500 | 975 | 124 | solid | 19.61 | selec | int-gear |
| Ballstrom | A | 1,500 | 1,200 | 125* | pneu* | 15.64 | selec | int-g-4 |
| Buick | D4 | 1,500 | 1,150 | 122 | pneu | 22.50 | selec | bevel |
| Commerce | N | 1,500 | 875 | 120 | pneu | 19.61 | selec | bevel |
| Dart | BB | 1,500 | 1,300 | 124 | solid | 19.61 | prog | top worm |
| Denby | U | 1,500 | 800-c | 119 | solid | 15.64 | selec | int-gear |
| Diamond-T | JA-JB | 1,500 | 1,175 | 126* | solid | 19.61 | selec | top worm |
| Doriis | 1A4 | 1,500 | 1,300 | 144* | pneu | 30.65 | selec | bevel |
| Gabriel | H | 1,500 | 1,000 | 126 | pneu | 27.20 | selec | bevel |
| Garford | 64 | 1,500 | 1,350 | 120 | pneu | 19.61 | selec | dbl chn |
| G.M.C. | 15 | 1,500 | 1,000 | 122 | pneu | 19.61 | selec | bevel |
| Geneva | I | 1,500 | | 106 | solid | 22.10 | plan | dbl chn |
| I.H.C. | E | 1,500 | 950-c | 102 | solid* | 16.20 | ind-e | dbl chn |
| Independent | F | 1,500 | 1,285 | 128* | solid* | 19.61 | selec | top worm |
| Krebs | F | 1,500 | 1,000 | 120 | pneu | 22.50 | selec | top worm |
| Lippard-Stewart | W | 1,500 | 1,000 | 125* | pneu* | 22.50 | selec | top worm* |
| Little Giant | 15 | 1,500 | 1,500 | 120 | pneu | 19.61 | selec | top worm |
| Lincoln | D | 1,500 | 900 | 122 | pneu | 22.50 | selec | bevel |

## TRUCKS OF ¾-TON CAPACITY (Cont'd)

| Name and Model | | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|---|
| Menominee | E | 1,500 | 1,125 | 124 | solid | 22.50 | selec | sp-bev |
| Palmer-Moore | K | 1,500 | 1,150 | 108 | solid* | 19.61 | selec | int-gear |
| Paulding | DJ | 1,500 | 975 | 120* | solid | 16.92 | selec | int-gear |
| Rex | F | 1,500 | 1,000 | 120 | pneu | 27.20 | selec | bevel |
| Republic | F | 1,500 | 905-c | 124 | solid* | 19.61 | selec | int-gear |
| Sanford | O | 1,500 | 1,200 | 120 | pneu* | 19.61 | selec | int-gear |
| South Bend | 30 | 1,500 | 1,475 | 128 | pneu | 22.50 | selec | top worm |
| Sterling | | 1,500 | 885 | 127 | pneu | 15.64 | prog | top worm |
| Stewart (B) | 3 | 1,600 | | 118* | pneu | 19.61 | selec | int-gear |
| Tifin | A-AC | 1,500 | 1,400* | 112 | solid | 19.61 | selec | int-gear* |
| White | GBBE | 1,500 | 2,100 | 133½ | pneu | 22.50 | selec | bevel |
| Wilcox | N | 1,500 | 1,200 | 120 | pneu | 19.61 | selec | top worm |

## TRUCKS OF 1-TON CAPACITY

| Name and Model | | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|---|
| Adams | A | 2,000 | 1,850 | 136* | solid | 22.50 | selec | dbl chn |
| Atterbury | 9B | 2,000 | 1,775 | 140½ | solid | 22.50 | selec | top worm |
| Available | | 2,000 | 1,500 | 132* | solid | 22.50 | selec | top worm |
| Avery | C | 2,000 | 1,600 | 126 | solid | 22.50 | selec | dbl chn |
| Barker | U | 2,000 | 2,000 | 130 | solid | 35.60 | selec | top worm |
| Brockway | H | 2,500 | 1,600 | 124* | solid | 22.50 | selec | dbl chn |
| Brockway | J | 2,500 | 1,825 | 124* | solid | 22.50 | selec | top worm |
| Chase | A | 2,000 | 1,650 | 140 | solid | 19.61 | selec | top worm |
| Continental (C) | FL | 2,000 | 1,550 | 144* | solid | 22.50 | selec | top worm |
| Corbitt | B | 2,000 | 2,250 | 130 | solid | 22.50 | selec | top worm |
| Dart | B | 2,000 | 1,400 | 138* | solid | 19.61 | selec | dbl chn |
| Denby | B | 2,000 | 1,475 | 120 | solid | 19.91 | selec | int-gear |
| Forge | K | 2,000 | 1,175 | 130 | solid | 22.50 | selec | int-gear |
| Gabriel | O | 2,000 | 1,800 | 136 | pneu | 27.20 | selec | top worm |
| Garford | 75 | 2,000 | 1,450 | 120 | pneu | 19.61 | selec | top worm |
| G.M.C. | 25 | 2,500 | 1,800 | 144* | solid | 22.50 | selec | dbl chn |
| G.M.C. | 26 | 2,500 | 1,900 | 144* | solid | 22.50 | selec | top worm |
| Grams-Bernstein | | 2,000 | 1,500 | 118 | solid | 19.61 | ind-e | top worm |
| Henderson | D | 2,000 | 1,500 | 124* | pneu* | 22.50 | selec | top worm |
| I.H.C. | F | 2,000 | 1,500 | 128 | solid* | 19.61 | selec | int-gear |
| Indiana | S | 2,000 | | 128 | solid* | 19.61 | selec | top worm |
| Kelly-Springfield | K-30 | 2,000 | 2,000 | 120 | solid* | 22.50 | selec | dbl chn |
| Kissel-kar | | 2,000 | 1,500 | 125 | pneu* | 24.22 | selec | top worm |
| Koebler | K | 2,000 | 870 | 120 | solid | 19.61 | selec | int-gear |
| Krebs | G | 2,000 | 2,000 | 144 | solid | 22.50 | selec | top worm |
| Lambert | V3 | 2,000 | 1,800 | 120 | solid | 32.40 | fric | dbl chn |
| Landshaft | G1 | 2,000 | 1,250 | 124* | solid | 19.91 | selec | int-gear |
| Lange | C | 2,000 | 1,750 | 130* | solid | 22.50 | ind-e | dbl chn |
| Lippard-Stewart | H | 2,000 | 2,000 | 145 | solid | 22.50 | selec | top worm |
| Maccar | K | 2,000 | 2,100 | 150* | solid | 27.20 | selec | dbl chn |
| Maccar | L | 2,000 | 2,100 | 150* | solid | 27.20 | selec | top worm |
| Mack | AB | 2,000 | 2,000 | 144* | solid* | 25.60 | selec | top worm |
| Martin | R | 2,000 | 2,000 | 130 | solid | 25.60 | selec | dbl chn* |
| Menominee | F | 2,500 | 1,575 | 130* | solid | 22.50 | selec | top worm |
| Modern | T | 2,000 | | 132* | solid | 19.61 | selec | top worm |
| Moreland | | 2,000 | 1,550 | 126 | solid | 22.50 | selec | top worm |
| Nelson & LeMoon | E1 | 2,000 | 1,700 | opt | solid | 22.50 | selec | top worm |
| Packard | 1D | 2,000 | 2,200 | 126* | solid | 35.60 | prog | top worm |
| Palmer | | 2,000 | 1,350 | 113½ | pneu* | 22.50 | selec | int-gear |
| Palmer-Moore | M | 2,000 | 1,350 | 126 | solid* | 22.50 | selec | int-gear |
| Paulding | G-GJ | 2,000 | 1,300 | 120* | solid | 35.60 | selec | int-gear |
| Republic | E | 2,000 | 1,275 | 144 | solid* | 22.50 | selec | int-gear |
| Rex | CW | 2,000 | 2,450 | 130 | solid | 19.92 | selec | top worm |
| Sanford | P | 2,000 | 1,350 | 138 | pneu* | 19.61 | selec | int-gear |

ABBREVIATIONS: General, *, with other options; opt, optional. Price, -c, complete with body. Tires, Kind, pneu, pneumatic; cush, cushion; sol-st, solid in front, steel in rear; plas, pneumatic in front, solid in rear; pdc, pneumatic in front, cushion in rear; cbn, cushion in front, solid in rear. Gearset Type, prog, progressive sliding gear; selec, selective sliding gear; plan, planetary; ind-e, constant-mesh individual clutch; fric, friction; elec, electric. Final Drive, bevel, direct bevel; double-red, double-reduction; bevel and spur; int-gear, internal-gear; top worm, worm gear with worm on top; dbl chn, double chain; sing chn, single chain; -4, to front wheels; -4, to all four wheels.

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## TRUCKS OF 1-TON CAPACITY (Cont'd)

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| Selden ..... T | 2,000 | 1,700 | 126* | solid | 19 61 | selec | top worm |
| Service ..... 12B | 2,000 | 1,375 | 132 | solid | 19 61 | selec | top worm |
| Signal ..... F | 2,000 | 1,550 | 144* | solid | 22 50 | selec | top worm |
| Stewart (B) ..... A | 2,500 | 128 | 128 | solid | 19 61 | selec | int-gear |
| Stewart (C) ..... A | 2,500 | 96 | 96 | solid | 20 00 | plan | dbl chn |
| Studebaker ..... T | 2,000 | ... | 125 | pneu | 24 22 | selec | bevel |
| Superior ..... A | 2,000 | 1,350 | 124 | solid* | 19 61 | selec | int-gear |
| Tiffin ..... A1 | 2,000 | 1,600 | 112 | solid | 19 61 | selec | int-gear |
| Transit ..... E | 2,000 | 2,000 | 130 | solid | 32 40 | selec | dbl chn |
| Twin City ..... | 2,000 | 1,350 | 104* | solid | 20 00 | plan | dbl chn |
| Wichita ..... A | 2,000 | 1,650 | 110* | solid | 16 92 | selec | dbl chn |
| Wichita ..... K | 2,000 | 1,650 | 118* | solid | 19 61 | selec | top worm |
| Wilcox ..... S | 2,000 | 1,600 | 128 | pneu | 22 50 | selec | top worm |
| Witt-Will ..... WD1 | 2,240 | ... | 120 | solid | 22 50 | selec | top worm |

## TRUCKS OF 1½-TON CAPACITY

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| Adams ..... D | 3,000 | 2,300 | 136* | solid | 27 20 | selec | dbl chn |
| Bessemer ..... A | 3,000 | 1,800 | 136 | solid | 27 20 | selec | dbl chn |
| Continental (C) ..... HL | 3,000 | 1,750 | 144 | solid | 22 50 | selec | top worm |
| Croce ..... | 3,000 | 1,800 | 120* | solid | 25 60 | selec | top worm |
| DeKalb ..... D1 | 3,000 | 1,950 | 134* | solid | 27 20 | selec | top worm* |
| Dunby ..... D | 3,000 | 1,685 | 144* | solid | 22 50 | selec | int-gear |
| Diamond-T ..... 2L | 3,000 | 2,050 | 160* | solid | 27 20 | selec | top worm |
| Federal ..... M | 3,000 | 1,800 | 144* | solid | 27 20 | selec | top worm |
| F.W.D. ..... G | 3,000 | 3,600 | 124 | solid | 32 40 | ind-c | bevel-4 |
| Gabriel ..... M | 3,000 | 2,200 | 144 | pneu | 27 20 | selec | top worm |
| Garford ..... 66 | 3,000 | 1,800 | 142* | solid | 22 50 | selec | top worm |
| G.M.C. ..... 31 | 3,000 | 1,900 | 144* | solid | 22 50 | selec | top worm |
| Gramm-Bernstein ..... | 3,000 | 1,800 | 130* | solid | 19 61 | ind-c | top worm |
| Horner ..... F-G | 3,000 | ... | 145* | solid | 27 20 | selec | t.p worm* |
| Indiana ..... D | 3,000 | ... | 135 | solid | 27 20 | selec | top worm |
| Kelly-Springfield ..... K-31 | 3,000 | 2,050 | 144* | solid | 22 50 | selec | dbl chn |
| Kleiber ..... 1 | 3,000 | 2,250 | 140* | solid | 27 20 | selec | top worm |
| Larrabee ..... | 3,000 | 1,950 | 132 | solid | 27 20 | selec | top worm |
| Lippard-Stewart ..... F | 3,000 | 2,300 | 145 | solid | 27 20 | selec | top worm |
| Little Giant ..... H | 3,000 | 1,450 | 110 | solid | 19 61 | selec | dbl chn |
| Mack ..... AB | 3,000 | 2,350 | 144* | solid* | 25 60 | selec | top worm |
| Maxi ..... C&D | 3,000 | 2,600 | 132* | solid | 25 60 | prog | int-gear |
| Modern ..... N | 3,000 | ... | 144* | solid | 22 50 | selec | top worm |
| Mogul ..... LM | 3,000 | 1,600 | 125* | solid | 22 50 | selec | top worm |
| Moon ..... B | 3,000 | 1,650 | 140* | solid | 22 50 | prog | bevel |
| Moreland ..... | 3,000 | 1,850 | 136* | solid | 27 20 | selec | top worm |
| Notco ..... C | 3,000 | 2,250 | 144* | solid | 27 20 | selec | top worm |
| New York ..... L | 3,000 | 1,800 | 120* | solid | 22 50 | selec | top worm* |
| Old Reliable ..... | 3,000 | 1,950 | 138* | solid | 22 50 | selec | top worm |
| Packard ..... 11D | 3,000 | 2,500 | 126* | solid | 25 60 | prog | top worm |
| Paulding ..... E-E1 | 3,000 | 1,600 | 130* | solid | 25 60 | selec | int-gear* |
| Sandow ..... | 3,000 | 1,800 | 150* | solid | 22 50 | selec | top worm |
| Service ..... QW | 3,000 | 2,200 | 150 | solid | 27 20 | selec | top worm |
| Signal ..... H | 3,000 | 1,750 | 144 | solid | 22 50 | selec | top worm |
| South Bend ..... 40 | 3,000 | 1,750 | 130* | solid | 25 60 | selec | top worm* |
| Stegman ..... | 3,000 | 1,900 | 150 | solid | 27 20 | selec | top worm* |
| Sullivan ..... G | 3,000 | 1,600 | 129 | solid | 22 50 | selec | dbl chn |
| Tiffin ..... G1-GC | 3,000 | 1,800* | 128 | solid | 22 50 | selec | int-gear* |
| Universal ..... G | 3,000 | 1,950 | 130* | solid | 22 50 | selec | top worm |
| United ..... AG | 3,000 | ... | 144 | solid* | 22 50 | selec | top worm |
| Velie ..... 25 | 3,000 | 2,250 | 150 | solid | 27 20 | selec | top worm |
| White ..... TBC | 3,000 | 3,000 | 145½ | pneu | 22 50 | selec | double-red |
| Wichita ..... L | 3,000 | 1,800 | 118* | solid | 19 61 | selec | top worm |
| Wilcox ..... R | 3,000 | 1,800 | 134 | solid | 29 00 | selec | top worm |

## TRUCKS OF 2-TON CAPACITY

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| Acason ..... | 4,000 | 2,100 | 150 | solid | 29 00 | selec | top worm |
| Acme ..... | 4,000 | 2,000 | 148 | solid | 27 20 | selec | top worm |
| Armleder ..... HC | 4,000 | 2,500 | 148* | solid | 27 20 | selec | dbl chn |
| Armleder ..... HW | 4,000 | 2,800 | 148* | solid | 27 20 | selec | top worm |
| Atterbury ..... 6C | 4,000 | 2,375 | 131 | solid | 27 20 | selec | top worm |
| Autocar ..... 21F | 4,000 | 1,650 | 97 | solid* | 18 10 | prog | double-red |
| Available ..... | 4,000 | 2,000 | 111* | solid | 27 20 | selec | top worm |
| Avery ..... B | 4,000 | 2,750 | 125 | solid | 36 15 | selec | dbl chn |
| Barker ..... Y | 4,000 | 2,100 | 136 | solid | 25 60 | selec | top worm |
| Bessemer ..... D | 4,000 | 2,000 | 136 | solid | 27 20 | selec | top worm |
| Blair ..... 2C | 4,000 | 2,350 | 121* | solid | 22 50 | ind-c | top worm |
| Brockway ..... I | 4,000 | 2,950 | 140* | solid | 27 20 | selec | dbl chn |

## TRUCKS OF 2-TON CAPACITY (Cont'd)

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| Brockway ..... K | 4,000 | 2,125 | 140* | solid | 27 20 | selec | top worm |
| Burford ..... O | 4,000 | 2,000 | 132* | solid | 22 50 | selec | int-gear |
| Chase ..... R | 4,000 | 2,200 | 160* | solid | 27 20 | selec | top worm |
| Coleman ..... | 4,000 | 2,400 | 132 | solid | 25 60 | selec | top worm |
| Continental (C) ..... J | 4,000 | 2,100 | 146 | solid | 27 20 | selec | top worm |
| Corbitt ..... A | 4,000 | 2,500 | 145* | solid | 27 20 | selec | top worm |
| Dart ..... C | 4,000 | 1,900 | 144* | solid | 27 20 | selec | dbl chn |
| Dayton ..... U | 4,000 | 2,650 | 118½ | solid | 29 00 | selec | dbl chn |
| Denby ..... E | 4,000 | 1,985 | 144* | solid | 22 50 | selec | int-gear |
| Diamond-T ..... 2I | 4,000 | 2,200 | 160* | solid | ... | selec | top worm |
| Dorris ..... 1AW | 4,000 | 2,500 | 162* | solid | 30 65 | selec | top worm |
| Duplex ..... C | 4,000 | 2,800 | 130* | solid | 27 20 | selec | int-g-4 |
| Duplex ..... E | 4,000 | ... | 150* | solid | 29 00 | selec | int-g-4 |
| Fargo ..... N | 4,000 | 1,575 | 156 | solid | 27 20 | prog | int-gear |
| Garford ..... 70 | 4,000 | 2,300 | 142* | solid | 29 00 | selec | top worm |
| G. A. Scheele ..... | 4,000 | 2,800 | 138* | solid | 29 00 | selec | top worm |
| G.M.C. ..... 46 | 4,000 | 2,375 | 158* | solid | 27 20 | selec | dbl chn |
| G.M.C. ..... 41 | 4,000 | 2,375 | 158* | solid | 27 20 | selec | top worm |
| Headley ..... | 4,000 | 3,000 | 145 | solid | 27 20 | selec | dbl chn-4 |
| Horner ..... F-G | 4,000 | ... | 145* | solid | 27 20 | selec | top worm* |
| Independent ..... G | 4,000 | 1,900 | 144 | solid | 27 20 | selec | top worm |
| Jeffery ..... 401S | 4,000 | 2,750 | 124 | solid | 22 50 | ind-c | int-g-4 |
| Kelly-Springfield ..... K-35 | 4,000 | 2,750 | 144* | solid | 22 50 | selec | dbl chn |
| Kissel-car ..... | 4,000 | 2,100 | 144 | solid | 29 00 | selec | top worm |
| Knickerbocker ..... 16 | 4,000 | 2,200 | 144* | solid | 27 20 | selec | top worm |
| Krebs ..... H | 4,000 | 2,450 | 144* | solid | 27 20 | selec | top worm |
| Lambert ..... VS | 4,000 | 2,000 | 120 | solid | 32 40 | fric | dbl chn |
| Landshaft ..... J1 | 4,000 | 1,550 | 144* | solid | 27 20 | selec | int-gear |
| Lange ..... E | 4,000 | 2,350 | 136* | solid | 27 20 | ind-c | dbl chn |
| Lippard-Stewart ..... G | 4,000 | 2,600 | 158 | solid | 27 20 | selec | top worm |
| Little Giant ..... 16 | 4,000 | 2,500 | 144 | solid | 27 20 | selec | top worm |
| Mancar ..... J | 4,000 | 2,600 | 102* | solid | 32 40 | selec | dbl chn |
| Mercer ..... H | 4,000 | 2,600 | 102* | solid | 32 40 | selec | dbl chn |
| Mack ..... AB | 4,000 | 2,700 | 144* | solid* | 25 60 | selec | top worm |
| Max ..... E&F | 4,000 | 2,800 | 145* | solid | 25 60 | prog | int-gear |
| Martin ..... S | 4,000 | 2,150 | 121 | solid | 25 60 | selec | dbl chn* |
| Menominee ..... D | 4,000 | 2,240 | 144 | solid | 27 20 | selec | top worm |
| Modern ..... R | 4,000 | ... | 150* | solid | 27 20 | selec | top worm |
| Mogul ..... LW | 4,000 | 2,000 | 138* | solid | 27 20 | selec | top worm |
| Nelson & LeMoon ..... E2 | 4,000 | 2,250 | opt | solid | 27 20 | selec | top worm |
| Notco ..... D | 4,000 | 2,350 | 144* | solid | 27 20 | selec | top worm |
| Old Reliable ..... | 4,000 | 2,750 | 120* | solid | 29 00 | selec | dbl chn |
| Packard ..... 2D | 4,000 | 2,800 | 144* | solid | 25 60 | prog | top worm |
| Palmer ..... A | 4,000 | 1,875 | 144 | solid | 27 20 | selec | top worm |
| Paulding ..... H-HI | 4,000 | 1,950 | 160* | solid | 29 00 | selec | int-gear* |
| Peerless ..... TCL | 4,000 | ... | 145 | solid | 32 40 | selec | top worm |
| Pierce-Arrow ..... | 4,000 | 3,000 | 150* | solid | 25 60 | selec | top worm |
| Rae ..... J | 4,000 | 1,850 | 146 | solid | 27 20 | selec | dbl chn |
| Republic ..... A | 4,000 | 1,475 | 144 | solid | 27 20 | selec | int-gear |
| Rex ..... CDW | 4,000 | 2,800 | 144 | solid | 25 60 | selec | top worm |
| Salvador ..... | 4,000 | 2,000 | 124* | solid | 25 60 | selec | top worm |
| Sandow ..... | 4,000 | 2,350 | 171* | solid | 27 20 | selec | dbl chn |
| Sandow ..... | 4,000 | 2,000 | 171* | solid | 27 20 | selec | top worm |
| Sanford ..... M | 4,000 | 1,910 | 140* | solid | 25 60 | selec | int-gear* |
| Selden ..... JC | 4,000 | 2,000 | 150 | solid | 22 50 | selec | int-gear |
| Selden ..... JWL | 4,000 | 2,250 | 150* | solid | 27 20 | selec | top worm |
| Service ..... PW | 4,000 | 2,500 | 160* | solid | 27 20 | selec | top worm |
| Signal ..... J | 4,000 | 2,100 | 150 | solid | 27 20 | selec | top worm |
| South Bend ..... 40-A | 4,000 | 2,000 | 142 | solid | 25 60 | selec | top worm* |
| Standard ..... 70 | 4,000 | 2,000 | 140 | solid | 27 20 | selec | top worm |
| Sterling ..... L | 4,000 | 2,900 | 145* | solid | 25 60 | selec | top worm |
| Sullivan ..... E | 4,000 | 2,250 | 150 | solid | 27 20 | selec | top worm |
| Superior ..... | 4,000 | 1,900 | 144 | solid | 22 50 | selec | int-gear |
| Tiffin ..... MW-MC | 4,000 | 2,400* | 140 | solid | 27 20 | selec | top worm* |
| Tower ..... | 4,000 | 1,800 | 135 | solid | 19 61 | selec | top worm |
| Transit ..... F | 4,000 | 2,850 | 144 | solid | 32 40 | selec | dbl chn |
| Twin City ..... | 4,000 | 1,500 | 104* | solid | 19 61 | prog | dbl chn |
| Universal ..... D | 4,000 | 2,400 | 132* | solid | 25 60 | selec | dbl chn |
| United ..... BSW | 4,000 | 2,250 | 144* | solid | 27 20 | selec | top worm |
| U.S. ..... H | 4,000 | 2,700 | 138 | solid | 27 20 | ind-c | top worm |
| Vulcan ..... | 4,000 | 2,750 | 150* | solid | 30 00 | selec | dbl chn |
| Wichita ..... B | 4,000 | 2,100 | 118* | solid | 19 61 | selec | dbl chn |
| Wichita ..... M | 4,000 | 2,100 | 118* | solid | 19 61 | selec | top worm |
| Wilson ..... E | 4,000 | 2,000 | 144 | solid | 27 20 | selec | dbl chn |
| Witt-Will ..... WDE | 4,000 | 2,250 | 144 | solid | 27 20 | selec | top worm |

## TRUCKS OF 2½-TON CAPACITY

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| Adams ..... E | 5,000 | 2,500 | 146* | solid | 27 20 | selec | dbl chn |
| Armleder ..... EC | 5,000 | 2,800 | 148* | solid | 27 20 | selec | dbl chn |

**ABBREVIATIONS: General**, *, *with other options*; *opt*, *optional*. **Price**, *c*, *complete with body*. **Tires, Kind**, pneu, *pneumatic*; cush, *cushion*; sol-st, *solid in front, steel in rear*; pneu, *pneumatic in front, solid in rear*; pneu, *pneumatic in front, cushion in rear*; cush, *cushion in front, solid in rear*. **Gearset Type**, prog, *progressive sliding gear*; selec, *selective sliding gear*; plan, *planetary*; ind-c, *constant-mesh individual clutch*; fric, *friction*; elec, *electric*. **Final Drive**, bevel, *direct bevel*; double-red, *double-reduction*; *bevel and spur*; int-gear, *internal-gear*; top worm, *worm gear with worm on top*; dbl chn, *double chain*; sing chn, *single chain*; *4*, *to front wheels*; *4*, *to all four wheels*.

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## TRUCKS OF 2½-TON CAPACITY (Cont'd)

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| Brinton F | 5,000 | 2,250 | 138* | solid | 27.20 | selec | top worm |
| Croce | 5,000 | 2,600 | 130 | solid | 25.60 | selec | top worm |
| Dart CC | 5,000 | 2,100 | 150 | solid | 27.20 | selec | top worm |
| DeKalb DE | 5,000 | 2,450 | 136* | solid | 27.20 | selec | top worm* |
| Gersix C | 5,000 | 2,500 | 148* | solid | 33.75 | selec | top worm |
| Gramm-Bernstein | 5,000 | 2,600 | 156 | solid | 29.00 | ind-e | top worm |
| Kleiber Z | 5,000 | 2,750 | 150* | solid | 27.20 | selec | top worm |
| Larrabee | 5,000 | 2,200 | 140* | solid | 27.20 | selec | top worm |
| Martin E | 5,000 | 2,800 | 135 | solid | 29.00 | selec | dbl chn* |
| Mayol L | 5,000 | 2,250 | 138* | solid | 27.20 | selec | dbl chn |
| Moore | 5,000 | 2,500 | 162 | solid | 32.40 | selec | dbl chn |
| Moreland | 5,000 | 3,400 | 168* | solid | 32.40 | selec | top worm |
| Stegeman | 5,000 | 2,500 | 144* | solid | 27.20 | selec | top worm* |
| Stegeman Special | 5,000 | 2,500 | 142* | solid | 27.20 | selec | top worm* |

## TRUCKS OF 3-TON CAPACITY

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| A&B | 6,000 | . | 144 | solid | 42.64 | selec | int-g-f |
| Avery B | 6,000 | 3,200 | 126 | solid | 36.15 | selec | dbl chn |
| Ayers A | 6,000 | 2,300-c | 140 | wood | 36.15 | selec | dbl chn |
| Beech Creek 3A | 6,000 | . | 132 | solid | 40.00 | . | bevel-4 |
| Blair 2D | 6,000 | 3,250 | 121* | solid | 29.00 | ind-e | top worm |
| Coleman H | 6,000 | 3,000 | 138 | solid | 36.15 | selec | dbl chn |
| Duplex D | 6,000 | 3,300 | 130* | solid | 29.00 | selec | int-g-4 |
| F.W.D B | 6,000 | 4,000 | 124 | solid | 36.15 | selec | bevel-4 |
| G. A. Schacht | 6,000 | 3,200 | 168* | solid | 29.00 | selec | top worm |
| Horner F-G | 6,000 | . | 145* | solid | 32.40 | selec | top worm* |
| Kelly-Springfield K-40 | 6,000 | 3,400 | 150* | solid | 32.40 | selec | dbl chn |
| Kissolkar | 6,000 | 3,750 | 144 | solid | 32.40 | selec | dbl chn |
| Krubo I | 6,000 | 2,100 | 102* | solid | 27.20 | selec | top worm |
| Locomobile B | 6,000 | 3,500 | 150 | solid | 29.00 | selec | top worm |
| Male K, L&H | 6,000 | 3,300 | 132* | solid | 29.78 | prog | int-gear |
| Marion | 6,000 | . | 112 | solid | 36.15 | selec | top worm-4 |
| Nelson & LeMoon E3 | 6,000 | 2,950 | opt | solid | 32.40 | selec | top worm |
| Packard 3D | 6,000 | 3,400 | 156* | solid | 32.40 | prog | top worm |
| Peerless TC3 | 6,000 | . | 151* | solid | 32.40 | selec | dbl chn |
| Republic T | 6,000 | 2,400 | 163* | solid | 29.00 | selec | int-gear |
| Rowe DFW | 6,000 | 3,400 | 156 | solid | 29.00 | selec | top worm |
| Sandow | 6,000 | 2,300 | 168* | solid | 32.40 | selec | dbl chn |
| Sandow | 6,000 | 2,500 | 186* | solid | 32.40 | selec | top worm |
| Universal A | 6,000 | 3,400 | 132* | solid | 25.60 | selec | dbl chn |
| Volts C | 6,000 | 2,750 | 142 | solid | 32.40 | selec | dbl chn |
| Vulcan | 6,000 | 3,250 | 156* | solid | 30.00 | selec | dbl chn |
| White TAD | 6,000 | 3,200 | 163 | solid | 22.50 | selec | dbl chn |

## TRUCKS OF 3½-TON CAPACITY

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| Acason | 7,000 | 2,500 | 170 | solid | 29.00 | selec | top worm |
| Armleder HW | 7,000 | 3,500 | 156* | solid | 32.40 | selec | top worm |
| Atterbury 6D | 7,000 | 3,175 | 162 | solid | 32.40 | selec | top worm |
| Available | 7,000 | 3,000 | opt | solid | 32.40 | selec | top worm |
| Bessemer E | 7,000 | 2,800 | 150 | solid | 32.40 | selec | top worm |
| Buffard D | 7,000 | . | 123* | solid | 32.40 | selec | top worm |
| C.T | 7,000 | 4,800 | 132 | solid | 36.15 | selec | int-g-4 |
| Continental C M | 7,000 | 3,000 | 168* | solid | 32.40 | selec | top worm |
| Couple-Gear HC | 7,000 | 4,800 | 141 | solid | 53.00 | selec | bevel-4 |
| Dayton A | 7,000 | 3,100 | 146 | solid | 36.15 | selec | dbl chn |
| Diamond-T L | 7,000 | 3,500 | 165 | solid | 32.40 | selec | top worm |
| Federal L | 7,000 | 2,900 | 176 | solid | 32.40 | selec | top worm |
| G.M.C 7B | 7,000 | 3,175 | 161* | solid | 32.40 | selec | dbl chn |
| G.M.C 7D | 7,000 | 3,175 | 161* | solid | 32.40 | selec | top worm |
| Gramm-Bernstein | 7,000 | 3,000 | 168 | solid | 29.00 | ind-e | top worm |
| Hall | 7,000 | 2,800 | 141* | solid | 32.40 | prog | dbl chn |
| Hall | 7,000 | 2,800 | 141* | solid | 32.40 | prog | top worm |
| Harvey WH | 7,000 | 2,700 | 164* | solid | 29.00 | selec | top worm |
| King | 7,000 | 3,600 | 120 | solid | 32.40 | ind-e | dbl chn |
| Kleiber 3 | 7,000 | 3,300 | 160 | solid | 32.40 | selec | top worm |
| Knickerbocker 16 | 7,000 | 2,650 | 164* | solid | 32.40 | selec | top worm |
| Maccar O | 7,000 | 3,250 | 174* | solid | 32.40 | selec | dbl chn |
| Maccar M | 7,000 | 3,250 | 174* | solid | 32.40 | selec | top worm |
| Mack AC | 7,000 | 3,400 | 168* | solid | 40.00 | selec | dbl chn |
| Modern B | 7,000 | 1,700 | 176* | solid | 36.15 | selec | top worm |
| Mogul T | 7,000 | 2,550 | 168* | solid | 32.40 | selec | dbl chn |
| Royal A | 7,000 | 3,500 | 146 | solid | 29.00 | ind-e | top worm |
| Selden N | 7,000 | 2,950 | 164 | solid | 32.40 | selec | top worm |
| Service HW | 7,000 | 3,000 | 171* | solid | 32.40 | selec | top worm |
| Signal M | 7,000 | 3,000 | 166* | solid | 32.40 | selec | top worm |
| South Bend 60 | 7,000 | 3,250 | 160* | solid | 36.15 | selec | top worm |
| Standard 60 | 7,000 | 3,850 | 164* | solid | 32.40 | selec | top worm |
| Stegeman | 7,000 | . | 158 | solid | 32.40 | selec | top 3.75* |
| Sterling | 7,000 | 3,400 | 158* | solid | 29.00 | selec | top worm |
| Transit T | 7,000 | 3,500 | 144* | solid | 32.40 | selec | dbl chn |
| United CSW | 7,000 | 2,900 | 144* | solid | 32.40 | selec | top worm |
| U.S J | 7,000 | 3,400 | 162 | solid | 32.40 | ind-e | top worm |
| Velie 26 | 7,000 | 3,350 | 172 | solid | 32.40 | selec | top worm |
| Wichita O | 7,000 | 3,250 | 165 | solid | 29.00 | selec | top worm |

## TRUCKS OF 4-TON CAPACITY

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| Blair 2E | 8,000 | 3,750 | 133* | solid | 32.40 | ind-e | top worm |
| Kelly-Springfield K-45 | 8,000 | 3,800 | 150* | solid | 32.40 | selec | dbl chn |
| Kissolkar | 8,000 | 3,350 | 162 | solid | 36.25 | selec | dbl chn |
| Locomobile BB | 8,000 | 3,650 | 150 | solid | 29.00 | selec | top worm |
| Main M | 8,000 | 3,750 | 145* | solid | 39.75 | prog | int-gear |
| Martin L | 8,000 | 3,300 | 145 | solid | 36.15 | selec | dbl chn* |
| Moreland | 8,000 | 3,200 | 186* | solid | 36.15 | selec | top worm |
| Old Reliable | 8,000 | 3,750 | 126 | solid | 36.15 | selec | dbl chn |
| Packard 4D | 8,000 | 3,800 | 156* | solid | 32.40 | prog | top worm |
| Peerless TC4 | 8,000 | . | 151* | solid | 32.40 | selec | dbl chn |
| Standard 40 | 8,000 | 3,025 | 144* | solid | 32.40 | selec | dbl chn |

## TRUCKS OF 5-TON CAPACITY

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| A&B | 10,000 | . | 144 | solid | 42.64 | selec | int-g-f |
| Avery B | 10,000 | 4,500 | 128 | solid | 44.20 | selec | dbl chn |
| Blair 2F | 10,000 | 4,500 | 135* | solid | 32.40 | ind-e | top worm |
| C.T | 10,000 | 5,200 | 158 | solid | 41.61 | selec | int-g-4 |
| Couple-Gear AC | 10,000 | 5,200 | 144 | solid | 53.00 | selec | bevel-4 |
| Dayton B | 10,000 | 4,500 | 148 | solid | 44.20 | selec | dbl chn |
| F.W.D M | 10,000 | 4,400 | 148 | solid | 44.20 | selec | bevel-4 |
| Garford D | 10,000 | 4,300 | 128* | solid | 36.15 | selec | dbl chn |
| G.M.C 100 | 10,000 | . | 163* | solid | 32.40 | selec | dbl chn |
| G.M.C 101 | 10,000 | . | 163* | solid | 32.40 | selec | top worm |
| Hall | 10,000 | 3,400 | 144* | solid | 32.40 | prog | dbl chn |
| Harvey WK | 10,000 | 3,400 | 168* | solid | 32.40 | selec | top worm |
| Horner F | 10,000 | . | 156* | solid | 44.20 | selec | dbl chn |
| Kelly-Springfield K-50 | 10,000 | 4,250 | 150* | solid | 32.40 | selec | dbl chn |
| Kleiber 5 | 10,000 | 4,250 | 170* | solid | 44.20 | selec | top worm |
| Moore | 10,000 | 4,500 | 175 | solid | 44.20 | selec | dbl chn |
| Old Reliable | 10,000 | 4,250 | 126* | solid | 36.15 | selec | dbl chn |
| Peerless TC5 | 10,000 | . | 151* | solid | 32.40 | selec | dbl chn |
| Pierce-Arrow | 10,000 | 4,300 | 168* | solid | 38.25 | selec | top worm |
| Rowe TW | 10,000 | 4,500 | 156 | solid | 36.15 | selec | top worm |
| Royal A | 10,000 | 4,500 | 146* | solid | 36.15 | selec | top worm* |
| Samar | 10,000 | 4,500 | 151 | solid | 30.65 | selec | dbl chn |
| Service HX | 10,000 | 4,000 | 171* | solid | 36.15 | selec | dbl chn |
| Standard 50 | 10,000 | 3,400 | 144* | solid | 29.00 | selec | top worm |
| Stearns | 10,000 | 3,950 | 141* | solid | 29.00 | selec | dbl chn |
| Sterling | 10,000 | 4,500 | 178 | solid | 32.40 | selec | dbl chn |
| Sterling | 10,000 | 4,500 | 178 | solid | 32.40 | selec | top worm |
| Tifin RW-R | 10,000 | 4,250* | 168 | solid | 32.75 | selec | top worm* |
| Transit V | 10,000 | 4,500 | 144* | solid | 32.40 | ind-e | dbl chn |

**ABBREVIATIONS: General,** *, with other options; opt, optional. **Price,** -c, complete with body. **Tires, Kind,** pneu, pneumatic; cush, cushion; sol-st, solid in front, steel in rear; pneu, pneumatic in front, solid in rear; pneu, pneumatic in front, cushion in rear; cushion in front, solid in rear. **Gearset Type,** prog, progressive sliding gear; selec, selective sliding gear; plan, planetary; ind-e, constant-mesh individual clutch, friction, elec, electric. **Final Drive,** bevel, direct bevel; double-reduction, bevel and spur; int-gear, internal-gear; top worm, worm gear with worm on top; dbl chn, double chain; sing chn, single chain; -4, to front wheels; -4, to all four wheels.

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## TRUCKS OF 5-TON CAPACITY (Cont'd)

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| United ESW | 10,000 | 3,500 | 144* | solid | 41.61 | selec | top worm |
| U.S. K | 10,000 | 4,200 | 168 | solid | 32.40 | ind-e | top worm |
| Velie T | 10,000 | 3,600 | 142 | solid | 40.00 | selec | dbl chn |
| Vulcan | 10,000 | 4,500 | 163* | solid | 39.00 | selec | dbl chn |
| Walter | 10,000 | 4,750 | 144* | solid* | 30.65 | selec | spur-g-4 |
| Watson | 10,000 | | 154 | solid | 30.65 | selec | spur-g-4 |
| White TCD | 10,000 | 4,500 | 169 | solid | 29.00 | selec | dbl chn |

## TRUCKS OF 5½-TON CAPACITY

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| Mack AC | 11,000 | 4,000 | 168* | solid | 40.00 | selec | dbl chn |

## TRUCKS OF 6-TON CAPACITY

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| Deane | 12,000 | 4,50 0-c | 178 | solid | 36.15 | selec | dbl chn |
| Garford F | 12,000 | 4,500 | 128* | solid | 41.61 | selec | dbl chn |
| Gramm-Bernstein | 12,000 | 4,300 | 166* | solid | 32.40 | ind-e | top worm |
| G. V. Mercedes FV | 12,000 | | 169 | solid | 29.00 | selec | int-gear |
| Kelly-Springfield K-40 | 12,000 | 4,500 | 150* | solid | 32.40 | selec | dbl chn |
| Kissel-car | 12,000 | 4,350 | 160 | solid | 38.25 | selec | dbl chn |
| Old Reliable | 12,000 | 4,500 | 126* | solid | 36.15 | selec | dbl chn |
| Peerless TCS | 12,000 | | 151* | solid | 32.40 | selec | dbl chn |
| Royal A | 12,000 | 4,800 | 140 | solid | 41.61 | ind-e | dbl chn |
| Tifin SW-S | 12,000 | 4,550* | 168 | solid | 33.75 | selec | top worm* |
| Walter | 12,000 | 5,000 | 144* | solid | 30.65 | selec | spur-g-4 |

## TRUCKS OF 6½-TON CAPACITY

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| Sauer | 13,000 | 5,800 | 156½ | solid | 30.65 | selec | dbl chn |

## TRUCKS OF 7-TON CAPACITY AND OVER

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| Dayton E | 15,000 | 4,250 | 148 | solid | 44.20 | selec | dbl chn |
| Mack AC | 15,000 | 4,500 | 180 | solid | 40.00 | selec | dbl chn |
| Sterling | 14,000 | 4,750 | 178 | solid | 36.15 | selec | dbl chn |
| Walter | 15,000 | 5,250 | 144* | solid | 30.65 | selec | spur-g-4 |

## TRACTORS

| Name and Model | Capacity, Pounds | Chassis Price | Wheelbase | Tires | Motor Horsepower | Gearset Type | Final Drive |
|---|---|---|---|---|---|---|---|
| C.T. | | 5,000 | | solid | 41.61 | elec | int-g-4 |
| Dominion | 12,000 | 3,300 | 90 | solid | 36.15 | selec | top worm |
| Knox 35 | | 4,500 | 108 | solid | 40.00 | selec | dbl chn |
| Lombard | 10,000 | | | steel | | | top worm |
| Mack AC | 30,000 | 4,000 | 116½ | solid | 40.00 | selec | dbl chn |
| Mercury-Bulley A | | 3,400 | 71 | solid | 32.40 | ind-e | dbl chn |
| Mercury-Bulley | | 3,400 | 71 | solid | 32.40 | ind-e | dbl chn |
| Phoenix Centiped | | | | steel | 48.48 | ind-e | int-gear |
| Standard B | 12,000 | 3,250 | 72 | solid | 36.15 | ind-e | dbl chn |
| Standard D | 20,000 | 4,000 | 76 | solid | 36.15 | ind-e | dbl chn |
| Transport T | 10,000 | 2,500 | 80 | solid | 19.61 | selec | top worm |
| Walter | 24,000 | 5,000 | 108* | solid | 30.65 | selec | spur-g-4 |

**ABBREVIATIONS: General**, *, *with other options; opt, optional.* **Price**, *-c, complete with body.* **Tires, Kind**; pneu, *pneumatic*; cush, *cushion*; sol-st, *solid in front, steel in rear*; pneu, *pneumatic in front, solid in rear*; pneu, *pneumatic in front, cushion in rear*; sol-c, *cushion in front, solid in rear.* **Gearset Type**, prog, *progressive sliding gear*; selec, *selective sliding gear*; plan, *planetary*; ind-e, *constant-mesh individual clutch*; fric, *friction*; elec, *electric.* **Final Drive**, bevel, *direct bevel*; double-red, *double-reduction, bevel and spur*; int-gear, *internal-gear*; top worm, *worm gear with worm on top*; dbl chn, *double chain*; sing chn, *single chain*; -f, *to front wheels*; -4, *to all four wheels.*

# Glossary of Terms Used in Specifications

## How to Read THE COMMERCIAL VEHICLE's Tables

STRUCTURAL details of 408 gasoline truck chassis, produced by 150 manufacturers will be found on the twelve pages following this article. These tables contain thirty-six separate items of information on each vehicle, except where THE COMMERCIAL VEHICLE has been unable to procure the information authoritatively from the officials of the manufacturing concern. Each make of vehicle is segregated into a separate group and each model has a line to itself.

Even thus condensed, it has been necessary to use a number of abbreviations. These are explained at the bottom of each table, in which the term abbreviated is given.

Not all users of motor trucks are familiar with the exact meaning of all the various technical terms used to describe different forms of construction. Below, in the order in which the terms will be encountered in the table will be found brief explanations of these terms:

### Capacity in Pounds

The load capacity of a motor truck is the maximum amount of load it is intended to carry in regular service, in addition to the weight of the body, the cab and the crew.

### Price of Chassis

The chassis price is the list price of the chassis, equipped with a standard seat or cab, and all other standard equipment except the body, which is usually either selected from a stock of standard bodies, or built to order, being charged for extra. Some makers, however, do not sell chassis not equipped with bodies, as indicated in the table by a small c following the price, representing that the price is for the **complete** vehicle.

### Wheelbase

Wheelbase is the length between the centers of the front and rear axles along the centerline of the truck.

### Kinds of Tires

Tires are made of rubber, steel, and wood. Rubber tires are of four sorts, **solid, pneumatic,** sectional or **block,** and **cushion.** When the latter terms are used, that the tires are of rubber is understood.

### Sizes of Tires

Two dimensions are usually given, the **diameter** and the **width.** The diameter is the total diameter from tread to tread. Many tires are oversize, however, and actually exceed their **rated** diameter. Width is often called tread, but in reality, it represents the width at the base. Some tires have greater tread width than others of **equal base width,** because of different cross-sectional contour. Rubber tires are made single and dual, a dual tire being two single ones on one rim. When a tire is specified as of a certain size, **dual,** this represents two tires of that size together on one rim.

### Motor Location

There are five common motor locations. The first and most popular is **under the hood,** forward of the dashboard, at the

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extreme front of the chassis. There are two styles of hoods, the first and most common form of which consists of a metal cover of substantially uniform height and width extending from the radiator in front to the dash at the rear. Lately, the form of such hoods has been changed on some trucks, so that it slopes upward along the ridgepole or flares outward at the sides. Vehicles with this type of hood are said to be of the **European** type.

The second type of hood is a one-piece cover somewhat similar to an inverted scoop or scuttle, with a sloping top, flaring sides, also sloping somewhat to the top. In this type, the radiator is mounted back of the motor, on the dash. Trucks with such hoods are called **French** types, and such hoods are called **French hoods** or of the **Renault**—pronounced Ren-oh—type.

The second type of motor location is **under the floor** of the cab. This has variations, in some of which the motor is located well forward, and in others, further back, the radiator being mounted in front, on the dash, in some cases, and in others in back, behind and below the seat. Trucks with this form of motor location are known as of the **American** type.

The third type of motor location is that wherein the motor is under a hood with the driver's seat located alongside instead of behind it, or, in other words, the motor is located **between the seats**. This type varies greatly, some trucks having the motor hood further forward than others and some having it lower than others, so that it more nearly approximates the American type. Trucks with this motor location are called **Compromise** types.

The fourth position of the motor is **under the seat**, the motor being further to the rear than in the American type, and the floor lower. The radiator is usually carried in front in this construction.

The fifth position is **under the body**, usually back of the driver's seat, the radiator being in front or under the floor.

### Bore and Stroke

The bore of an engine is the inside diameter of each of its cylinders. The stroke is the distance the piston travels from its extreme upper or lower point to the extreme lower or upper point. These dimensions are given in inches.

### N. A. C. C. Horsepower

One horsepower is equal to 33,000 foot-pounds of energy, or sufficient power to lift 33,000 pounds 1 foot in 1 minute. It is figured theoretically in a four-cycle gasoline engine by the formula first adopted by the A. L. A. M., and now a N. A. C. C. standard, as follows: $H.P. = \frac{D^2 N}{2.5}$, in which D is the diameter of the cylinder in inches, or the bore, and N is the number of cylinders.

### Valves Placed

Valves in a gasoline engine are for the purpose of admitting and releasing the active gas whose combustion within the cylinder furnishes the power. In a four-cycle engine as used on trucks, there are two types of valves, the **poppet** type and the **sleeve** type.

The poppet valve is shaped somewhat like a mushroom and fits down over a hole with a beveled or flat edge to correspond with that on the valve, being raised by a cam to effect an opening. They may be located **in the head, at the side,** or on **opposite** sides. They may also be located in two positions, as the intake at one side and the exhaust valve in the head.

There are three types of cylinder castings, the **L-head,** the **T-head** and the **I-head.** L-head cylinders have pockets at one side, in which the valves are located. T-head cylinders have these pockets at both sides, one for the exhaust and the other for the inlet, and I-head cylinders have their valves at the top of the cylinder, without pockets.

Sleeve-valve engines use hollow cylindrical sleeves, two in number, lining the cylinder and surrounding the piston. The cylinders have slots in them for the inlet and exhaust, corresponding slots in the sleeves serving to establish or cut off communication with the cylinder. There are two sleeves so that by having them move up and down at different times, their slots may be made to effect quick openings and closures of the ports. The sleeves are reciprocated by small cranks acted on by eccentrics. Engines with such valves are called **Knight** engines, after their inventor, Charles Y. Knight.

**Two-cycle** engines do not have valves, for an explosion takes place in each cylinder on each down stroke, as against once every other stroke in the four-cycle. In lieu of valves, ports are cut in the sides of the cylinders, similar to those on Knight engines, except that they are located near the bottom of the cylinder, thus being opened by the piston itself when it reaches the bottom of its stroke, and closed again when it starts upward.

### Water Circulation

Two types of water pumps are in general use, the **centrifugal** type and the **gear** type. Centrifugal pumps consist of rotors with vanes or paddles on them, inclosed in a casing with an intake connection at the center and an outlet at the periphery. The rotor throws the water from the center to its periphery by centrifugal force. Gear pumps consist of meshing gears in close-fitting casings, with the intake and outlet connections on opposite sides of the point of meshing, the gear teeth acting as paddle-wheels. **Thermo-syphon** or natural circulation is induced by the rising of the water in the jackets due to heat, whence it overflows into the radiator through an outlet pipe, and runs back through the radiator to the lower connection to the jackets to be re-circulated.

### Radiator Core Type

Radiators are to be divided into two general classifications, **cellular** and **tubular.** The true **cellular** radiator is built up of sheet metal so as to form intersecting vertical and horizontal water passages and rectangular or hexagonal air passages. Tubular radiators are of three kinds, flat- or square-**tube, round-tube** and **zig-zag-tube.** Square-tube radiators have rectangular tubes arranged to resemble a cellular or honeycomb type, but being in reality individual tubes, either vertical or horizontal. Round tubular radiators have either vertical or horizontal pipes, entirely independent of one another. They are of two types, one of which has the tubes sweated into cross plates, which serve to radiate additional heat, and the other of which has individual fins attached to the tubes separately. The former is called the **tubular** type and the latter the **finned-tube** type. Zig-zag tubular radiators consist of square tubes which are crimped to form diamond-shaped air passages to resemble the cellular type of radiator.

The **ring** type of radiator appears in this country for the first time in 1916. This consists of a copper tubular radiator, the tubes being smooth and bare and arranged in a ring about a centrifugal fan. The construction as used in this country is similar to, but not identical, with the French Solex radiators.

### Radiator Case Type

The case of a radiator incloses the core and serves as a tank at the top and bottom to distribute and collect again the water which goes through the core. Radiator cores are made of sheet metal and of cast metal. In the former case they are usually of sheet brass, soldered together. Cast cases are usually of aluminum and made in several sections built up and sealed with gaskets. There are other types which are partially cast and partly of sheet metal, the tanks at top and bottom being of cast aluminum and the side plates of sheet metal.

### Ignition Type

High-tension ignition systems are of the **single, dual, double,** and **dual-double** types, in general use. Single systems consist of a single set of plugs, supplied by the magneto only. Dual systems have a battery which may be used alternately with the magneto, in starting or running slowly. Double systems have two sets of plugs, one of which is supplied by the magneto and the other by a battery. Dual-double systems have two sets of plugs, either of which may be supplied by either the magneto or the battery. In some cases, two batteries are used in dual and double systems instead of the magneto.

### Spark-advance

Spark-advance is employed to allow for the lag in ignition, or the time it takes the charge to burn, so that at high speeds the spark may occur earlier in the engine cycle, so that by the time ignition has occurred the piston will not have more

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than just passed top center, permitting it to be retarded in low speeds and in starting to prevent back-kicks which would result from a too-early spark. The usual method is to have a lever on the steering wheel or column, for **hand** manipulation. Another method is to provide a governor on the magneto which **automatically** advances and retards the spark in accordance with the speed of the engine. A new development is a combination of these two by which the spark governor is given a limited range which may be advanced or retarded by a hand lever. In other systems, the advance is **fixed** at top center, or thereabouts, having no adjustment.

### Governor Type

Governors are of the **centrifugal, loose-ball, suction,** and **hydraulic** types. The centrifugal governor consists of revolving weights attached to toggle-levers so that as their speed of rotation increases, and they fly outward against a spring or the retarding influence of gravity, they impart movement to the toggle-levers which, acting upon a throttle in the intake pipe, cause the engine to be shut off at a certain critical speed. The loose-ball type is similar to this except that the weights are balls which are not mechanically connected to the rest of the mechanism, but float between two cones which take the place of the toggle-levers. The suction type is located in the intake manifold and is acted upon by the engine suction rather than by the speed of the engine. The hydraulic type is little more than a pressure gauge which is acted upon by the pressure of the water at high speeds.

### Governor Drive

Three types of governor drive are employed, the first, **from the motor,** causing the governor to control the engine according to its own speed. The second type is driven **from the front wheel,** the **driveshaft,** or the **gearset** layshaft, and controls the motor in accordance with the speed of the truck. The third type is known as **duplex** drive, consisting of a combination of the above two methods, arranged with over-running clutches so that the fastest of two driving shafts controls the speed of the motor.

### Lubrication

There are two principal types of motor lubrication, splash, and non-splash. Simple, or **non-circulating splash,** consists of the introduction of oil into a splash-pit in the crankcase up to a certain maximum level, from which it is splashed by the connecting rods to the various inner parts of the motor. **Circulating-splash** is similar, except that an additional reservoir or sump is located below the crankcase, into which the oil overflows, is strained, pumped out again and fed back into the splash pits, sometimes over the timing gears or bearings.

**Splash-pressure** is similar to circulating-splash, except that the oil is pumped out of the reservoir and onto the engine bearings and possibly through drillways in the crankshaft to the connecting rod and wrist-pin bearings under pressure.

**Pressure** oiling is the first of the non-splash methods, being similar to the splash-pressure system except that there is no splashing, but every wearing part is oiled either by direct pressure or by a fine mist of oil that is thrown out by the connecting rods as their bearings overflow.

**Fuel-injection** oiling is used only in two-cycle motors and consists of the admixture of lubricant with the fuel, so that the cylinders are oiled by the gas itself.

### Clutch Type

Clutches are used to connect the engine, in motion, with the transmission mechanism, at rest, in order to start the truck in motion. It is necessary to start the engine, disconnected, before connecting it with the transmission line because internal-combustion motors will not start spontaneously, but must be set in motion externally, and because they do not generate sufficient power to take a load until they have attained speed. The most common type of clutch is the **cone** type. This consists of a relatively flat truncated cone, faced with leather or other friction material, and acting upon a conical face of the flywheel or female clutch member. A variation of this type consists of the **reversed cone** clutch, in which the male cone faces to the rear instead of forward.

Disk clutches are of two types, dry and wet. **Dry-disk** clutches consist of a series of disks or plates each alternate one of which is attached respectively to a shaft or inner drum or to the casing of the clutch. When tightly compressed, these disks adhere and cause the casing to drive the inner member or **vice-versa. Wet-disk,** or **disk-in-oil** clutches are similar except that the disks are of metal only, without facing, and run in a bath of oil. **Dry-plate** and **wet-plate** clutches are similar to the above except that they have only three friction elements instead of a number. **Contracting-band** and **expanding-shoe** clutches are explained by their names.

### Gearset Type

Under gearsets, in the table, are grouped all manner of change-speed devices. Gearsets are of three types, sliding gear, individual clutch, and planetary. Sliding gearsets consist of spur gears of different sizes, carried on parallel shafts, which when slid into mesh in various combinations result in transmission of the drive at various reductions. They are of two kinds, **selective** and **progressive.** The selective gearset may be changed from neutral to any speed without passing through intermediate speeds. In the progressive type, neutral is located either between first speed and reverse or between first and second. In reaching alternate speeds it is necessary to pass through intermediate speeds.

The **planetary** gearset consists of a series of small gear pinions surrounding a master gear, like the planets surround the sun, the planetary pinions meshing also with an encircling internally-toothed gear, or, at a different reduction, with another solar gear. A clutch may connect the two concentric solar gears for direct drive, while two band brakes, operating in connection with jaw clutches, may hold the frame which holds the planetary gears or the secondary solar gear, so that a reduced forward speed or reverse may be had.

The **individual-clutch** constant-mesh gearset consists of a lay-out similar to the selective sliding type, except that all of the gears are constantly in mesh, or connected by silent chains, the different speeds being obtained by the manipulation of jaw clutches on the selective plan.

Among other types of change-gears is the **friction,** which consists of a driving disk, or disks, and a driven wheel, or wheels, friction-tired, and disposed perpendicularly with the disk, upon a shaft, so that it may be slid back and forth across the disk, thus securing different speed ratios, or clear across beyond the center of the disk to secure reverse.

The **electric** drive consists of a generator or dynamo connected with the engine, and electric motors to drive the wheels. The electric motors generate their power at all speeds, thus taking the gearset's place.

### Total Gear-Ratio

Total gear-ratio is the total reduction from the engine crankshaft to the road wheels. For example, if in high gear, the engine of a truck must revolve 9 times to one revolution of the road wheels, the gear-ratio is 9 to 1.

### Final Drive

Final driving means are greatly diversified. **Single-chain** drive consists of a single chain from a live axle to the change-gear. **Double-chain** drive consists of two chains driving the wheels individually from a jackshaft, laid across the frame, parallel with the dead rear axle, the jackshaft being driven by bevel gears, usually, from a driving shaft leading to the gearset.

**Bevel,** or direct bevel drive, consists of a live axle which is driven by bevel gears direct from the driving shaft. **Double-reduction** drive consists of a similar drive to direct bevel except that a set of spur gears is introduced between the bevel gears and the differential. **Internal-gear** drive consists of a live jackshaft incorporated with a dead axle, and driving the wheels by spur pinions meshing with internal teeth on the brake-drums.

**Worm-drive** is similar to direct bevel drive except that worm gears are substituted for bevel gears.

### Driving Torque

Driving torque is the tendency of a live axle to twist under driving stress. It is taken by means of the **springs,** which for this purpose are anchored to the axle with extra rigidity and shackled to the frame at one point only; by a **torque-arm** attached to the axle and, at one point, to the frame; by converging **radius-rods,** attached at opposite ends of the axle and to the frame at one point; by a **torsion tube,** surrounding the driving shaft; or by the extended engine **sub-frame,** which is attached to the center of the axle and at two points to the frame.

### Propulsion

Propulsion, or the pushing or pulling effort of the driving axle, is transmitted to the frame by **radius rods,** or distance rods, consisting of steel bars jointed to the axle and to the frame; by the **torsion tube,** or by the vehicle **springs.**

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# Specifications of 408 1916 American

## Fifth Annual Tabulation of Details of Chassis, Motor and Equipment
## Delivery Vehicles and Tractors Made by 150

| Name and Model | Capacity in Pounds | Price of Pounds | Wheelbase in Inches | Kind | TIRES SIZES IN INCHES Front | TIRES SIZES IN INCHES Rear | TIRES Location | MOTOR No. of Cylinders | MOTOR No. of Crankshaft Bearings | MOTOR Bore and Stroke | MOTOR N.A.C.C. Hp. | MOTOR Cylinders Cast | MOTOR Valves Placed | COOLING Water Circulation | COOLING Radiator Core and Case | IGNITION Type | IGNITION Make | IGNITION Spark Advance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A & B | 6,000 | | 144 | solid | 4x33/4d | 4x33/4d | under hood | 4 | 3 | 5x4½ | 42.64 | pairs | right | gear | fin-sheet | dual | Bosch | hand |
| A & B | 10,000 | | 150 | solid | 4x33/4d | 4x33/4d | under hood | 4 | 3 | 5x4½ | 42.64 | pairs | right | gear | fin-sheet | dual | Bosch | hand |
| Acme | 4,000 | 2,900 | 149 | solid | 36x4 | 36x6 | under hood | 4 | 3 | 4½x5½ | 27.70 | block | left | cent | fin-sheet | sing. | Eisemann | fixed |
| Adams A | 2,000 | 1,850 | 136* | solid | 36x3½ | 36x4 | under hood | 4 | 3 | 3¾x5½ | 22.50 | block | right | cent | fin-sheet | sing. | Eisemann | auto |
| Adams D | 3,000 | 2,300 | 138* | solid | 36x3½ | 36x3½ | under hood | 4 | 3 | 4½x5½ | 27.70 | block | left | cent | fin-sheet | sing. | Eisemann | auto |
| Adams E | 5,000 | 2,500 | 140* | solid | 36x4 | 36x4 | under hood | 4 | 3 | 4½x5½ | 27.70 | block | right | cent | fin-sheet | sing. | Eisemann | auto |
| Armsdor HC | 4,000 | 2,500 | 148* | solid | 36x4 | 36x7 | under hood | 4 | 3 | 4½x5½ | 27.70 | block | left | cent | cell-sheet | sing. | Bosch | hand |
| Armsdor HW | 6,000 | 2,800 | 148* | solid | 36x4 | 36x7 | under hood | 4 | 3 | 4½x5½ | 27.70 | block | left | cent | cell-sheet | sing. | Bosch | hand |
| Armsdor EC | 5,000 | 2,800 | 148* | solid | 36x4 | 36x4 | under hood | 4 | 3 | 4½x5½ | 27.70 | block | left | cent | cell-sheet | sing. | Bosch | hand |
| Armsdor HW | 7,000 | 3,500 | 156* | solid | 36x5 | 36x5 | under hood | 4 | 3 | 4½x5½ | 32.40 | pairs | left | cent | fin-cast | sing. | Bosch | hand |
| Atterbury 4B | 2,000 | 1,775 | 140 | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 3¾x5½ | 22.50 | block | left | cent | fin-cast | sing. | Bosch | fixed |
| Atterbury 5C | 4,000 | 2,375 | 151 | solid | 36x4 | 36x4 | under hood | 4 | 3 | 4½x5½ | 27.70 | block | left | cent | fin-cast | sing. | Bosch | fixed |
| Atterbury 6D | 7,000 | 3,175 | 167 | solid | 36x5 | 40x5 | under hood | 4 | 3 | 4½x5½ | 32.40 | pairs | left | cent | fin-cast | doub. | Bosch | hand |
| Autocar 21F | 4,000 | 1,650 | 97 | solid* | 34x4* | 34x4* | under seats | 2 | 2 | 4⅞x4½ | 18.10 | sing. | right | cent | fin-sheet | sing. | Bosch | fixed |
| Available | 2,000 | 1,500 | 132* | solid | 36x3 | 36x4 | under hood | 4 | 3 | 3¾x5 | 22.50 | block | right | thermo | cell-sheet | sing. | Bosch | fixed |
| Available | 4,000 | 2,000 | 144* | solid | 36x4 | 36x7* | under hood | 4 | 3 | 4½x5½ | 27.70 | block | left | cent | cell-sheet | sing. | Bosch | fixed |
| Available | 7,000 | 3,000 | opt. | solid | 36x5 | 40x5 | under hood | 4 | 3 | 4½x5½ | 32.40 | pairs | left | cent | cell-sheet | dual | Bosch | fixed |
| Avery C | 2,000 | 1,600 | 128 | solid | 34x3½ | 34x4 | under hood | 4 | ... | 4½x5½ | 27.70 | block | left | cent | fin-sheet | dual | Heinze | auto |
| Avery B | 4,000 | 2,700 | 128 | solid | 36x3½ | 36x3½ | under hood | 4 | ... | 4⅞x5 | 36.18 | sing. | left | cent | fin-sheet | dual | Eisemann | auto |
| Avery B | 6,000 | 3,200 | 128 | solid | 36x5 | 36x4 | under hood | 4 | ... | 4⅞x5 | 36.18 | sing. | left | cent | cell-sheet | dual | Eisemann | auto |
| Avery A | 6,000 | 2,500-c | 140 | wood | 34x5 | 34x5 | tire seats | 4 | ... | 4⅞x5 | 36.18 | sing. | left | cent | cell-sheet | dual | Eisemann | auto |
| Avery A | 10,000 | 4,500 | 128 | solid | 36x6 | 36x5d | under fir | 4 | ... | 5½x5½ | 44.20 | pairs | opp. | cent | cell-sheet | dual | Eisemann | auto |
| Barker U | 2,000 | 2,000 | 139 | solid | 42x3½ | 42x5 | under hood | 4 | ... | 4 x5 | 25.60 | block | left | thermo | cell-sheet | sing. | Eisemann | auto |
| Barker V | 4,000 | 2,400 | 136 | solid | 36x4 | 36x7 | under hood | 4 | ... | 4 x5 | 25.60 | block | left | thermo | cell-sheet | sing. | Eisemann | auto |
| Bauer A | 1,000 | 720 | 100 | solid* | 36x2½* | 36x2½* | under hood | 4 | 2 | 3⅞x5 | 22.50 | block | right | cent | fin-sheet | dual | opt. | hand |
| Bauer B | 1,500 | 840 | 110 | solid* | 36x2½* | 36x2½* | under hood | 4 | 2 | 3⅞x5 | 22.50 | block | right | cent | fin-sheet | dual | opt. | hand |
| Bessemer G | 1,500 | 975 | 124 | solid | 35x3 | 35x3½ | under hood | 4 | 3 | 3½x5 | 19.64 | block | right | thermo | fin-sheet | sing. | Bosch | hand |
| Bessemer A | 3,000 | 1,800 | 136 | solid | 37x3½ | 37x5 | under hood | 4 | 3 | 4½x5½ | 27.70 | block | right | cent | fin-cast | sing. | Bosch | hand |
| Bessemer D | 4,000 | 2,000 | 136 | solid | 37x4 | 37x3½ | under hood | 4 | 3 | 4½x5½ | 27.70 | block | right | cent | fin-cast | sing. | Bosch | hand |
| Bessemer E | 7,000 | 2,800 | 150 | solid | 37x5 | 37x4d | under hood | 4 | 3 | 4½x5½ | 32.40 | pairs | right | cent | fin-cast | sing. | Bosch | hand |
| Blair 2C | 4,000 | 2,450 | 121* | solid | 34x4 | 34x3½d | tire seats | 4 | 3 | 3¾x5½ | 22.50 | pairs | left | cent | cell-sheet | sing. | Bosch | fixed |
| Blair 2D | 6,000 | 3,250 | 121* | solid | 36x4 | 36x4d | tire seats | 4 | 3 | 4½x5½ | 29.00 | pairs | left | cent | cell-sheet | dual | Bosch | fixed |
| Blair 2E | 8,000 | 3,750 | 131* | solid | 36x5 | 36x5d | tire seats | 4 | 3 | 4½x5½ | 32.40 | pairs | left | cent | cell-sheet | dual | Bosch | fixed |
| Blair 2F | 10,000 | 4,500 | 151* | solid | 36x6d | 36x6d | tire seats | 4 | 3 | 4½x6½ | 32.40 | pairs | right | cent | cell-sheet | dual | Bosch | fixed |
| Bollstrom A | 1,500 | 1,200 | 125* | pneu* | 34x4½ | 35x4½ | under hood | 4 | 3 | 3¾x5½ | 15.64 | pairs | head | cent | cell-sheet | ... | ... | hand |
| Bossio Packet | 500 | 450-c | 100 | pneu | 28x3 | 28x3 | under hood | 4 | 2 | 2½4 | 12.06 | block | right | thermo | fin-sheet | sing. | Atw. Kent | auto |
| Brenton H | 1,200 | 815 | 96 | pneu* | 37x4 | 37x4 | under hood | 4 | 2 | 3½5 | 16.92 | block | left | thermo | fin-sheet | sing. | Berling* | hand |
| Brenton F | 5,000 | 2,250 | 138* | solid | 36x4 | 36x5 | under hood | 4 | 3 | 4½x5½ | 27.70 | block | left | cent | fin-sheet | sing. | Bosch | fixed |
| Brockway H | 2,500 | 1,600 | 124* | solid | 36x3½ | 36x4 | under hood | 4 | 3 | 3¾x5½ | 22.50 | block | left | cent | fin-cast | sing. | Bosch | fixed |
| Brockway J | 2,500 | 1,825 | 124* | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 3¾x5½ | 22.50 | block | left | cent | fin-cast | sing. | Bosch | fixed |
| Brockway L | 4,000 | 1,900 | 140 | solid | 36x4 | 36x5* | under hood | 4 | 3 | 4½x5½ | 27.70 | block | left | cent | fin-cast | sing. | Bosch | fixed |
| Brockway K | 4,000 | 2,125 | 140* | solid | 36x4 | 36x6* | under hood | 4 | 3 | 4½x5½ | 27.70 | block | left | cent | fin-cast | sing. | Bosch | fixed |
| Buick D4 | 1,500 | 1,150 | 122 | pneu | 33x5 | 33x5 | under hood | 4 | 3 | 3½5 | 22.50 | pairs | head | cent | cell-sheet | sing. | Delco | auto-t |
| Burford O | 4,000 | 2,000 | 132* | solid | 36x3½ | 36x3½d | under hood | 4 | 3 | 3¾x5½ | 22.50 | block | right | cent | fin-cast | sing. | Eisemann | fixed |
| Burford D | 7,000 | | 175* | solid | 36x5 | 38x5d | under hood | 4 | 3 | 4½x5½ | 32.40 | block | left | cent | fin-cast | sing. | Eisemann | fixed |
| Chase A | 2,000 | 1,650 | 140 | solid | 36x3½ | 36x5 | under hood | 4 | ... | 4½5½ | 19.61 | block | left | thermo | fin-sheet | sing. | Bosch | fixed |
| Chase B | 4,000 | 2,200 | 160* | solid | 36x3½ | 36x3½d | under hood | 4 | 3 | 4½x5½ | 27.70 | block | left | cent | fin-sheet | sing. | Bosch | fixed |
| Chase C | 7,000 | 3,000 | 160 | solid | 36x5 | 36x5 | under hood | 4 | 3 | 4½x5½ | 32.40 | pairs | left | cent | fin-cast | sing. | Bosch | fixed |
| Coleman J | 4,000 | 2,400 | 132 | solid | 36x4 | 36x3½d | under seats | 4 | ... | 4 x5 | 25.60 | block | left | cent | fin-sheet | sing. | Bosch | hand |
| Coleman H | 6,000 | 3,000 | 138 | solid | 36x5 | 36x5d | under seats | 4 | ... | 4½x5 | 36.15 | pairs | opp. | cent | fin-sheet | sing. | Bosch | hand |
| Commerce N | 1,500 | 875 | 120 | pneu | 34x4 | 34x4 | under hood | 4 | ... | 3½5 | 19.61 | block | left | thermo | fin-cast | sing. | Eisemann | fixed |
| C.T. | 7,000 | 4,500 | 132 | solid | 36x4d | 36x4d | under seats | 4 | ... | 4⅞x5 | 36.15 | pairs | opp. | cent | fin-cast | sing. | Bosch* | hand |
| C.T. | 10,000 | 5,200 | 156 | solid | 36x6d | 36x5d | under seats | 4 | ... | 5½x5½ | 41.61 | pairs | opp. | cent | fin-cast | sing. | Bosch* | hand |
| C.T. Tractor | | 3,000 | | solid | 36x4d | 38x4d | under seats | 4 | ... | 5½x5½ | 41.61 | pairs | opp. | cent | fin-cast | sing. | Bosch* | hand |
| Continental C | 1,500 | 1,250 | 111 | solid | 34x3 | 36x3 | under hood | 4 | ... | 3¾x5½ | 22.50 | pairs | left | cent | fin-cast | sing. | Bosch* | fixed |
| Continental CL | 1,500 | 1,750 | 111 | solid | 34x3 | 36x3 | under hood | 4 | ... | 3¾x5½ | 22.50 | pairs | left | cent | fin-cast | sing. | Bosch* | fixed |
| Continental C | 2,000 | 2,100 | 116 | solid | 34x3½ | 36x3½ | under hood | 4 | ... | 4½x5½ | 27.70 | pairs | left | cent | cell-cast | sing. | Bosch* | fixed |
| Continental C | 3,000 | 2,750 | 126* | solid | 36x5 | 36x5 | under hood | 4 | ... | 4½x5½ | 32.40 | pairs | left | cent | cell-cast | sing. | Bosch* | fixed |
| Corbitt B | 2,000 | 750 | 103 | solid | 30x3 | 30x3 | under hood | 4 | ... | 3½x5 | 19.61 | block | left | cent | fin-cast | sing. | Eisemann | hand |
| Corbitt A | 4,000 | 900 | 145* | solid | 36x3½ | 36x3½d | under hood | 4 | ... | 4½x5½ | 27.70 | block | left | cent | fin-cast | sing. | Eisemann | hand |

**ABBREVIATIONS; General.** *, with other options; opt, optional. **Price**, -c, complete with body. **Tires, Kind**, Pneu, pneumatic; Cush, cushion; D & S, pneumatic in front and solid in rear; S & D, solid in front and solid in rear. **Tire Sizes**, d, dual. **Motor Location**, tire seats, between seats; under fir, under floor. **Cylinders Cast**, sing, singly or individually. **Location of Valves**, opp, opposite or T-head type; top (in cylinder motors only), L-head cylinder last horizontal with valves up; r & h, at right and in hood, L-head cylinder; l & h, at left and in hood, L-head cylinder; 2-cyc, two-cycle motor; no valve. **Water Circulation**, cent, centrifugal pump; gear, gear pump; thermo, thermo-siphon circulation; air, air cooled, no water. **Radiator Type and Case**, fin-sheet, finned-tube core with sheet metal casing; fin-cast, finned-tube core with cast aluminum casing; wel-sheet, square tube or flat tube core with sheet metal casing; wel-cast, square tube core with cast aluminum casing; cell-sheet, cellular or honeycomb core with sheet metal casing, cell-cast cellular core with cast aluminum casing; s-a-s-sheet, zig-zag tube core with sheet metal casing; s-a-s-cast, zig-zag tube core with cast aluminum casing; rise-cast, copper tube core arranged in a ring about a central hub on with a cast aluminum casing. **Ignition, Type**, wire, single; doub, double. **Make of Magneto** (or other sparking device), Atw Kent, Atwater Kent. **Spark Advance**, auto, automatic; auto-a, automatic advance with hand adjustment; 2-pt, two-point fixed, battery circuit fixed in retard, magneto in advance.

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# Gasoline Commercial Vehicle Chassis

## *of* Domestic Gasoline and Gasoline-electric Motor Trucks, Light Manufacturers, for Convenient Comparison

| MOTOR | | | | | | TRANSMISSION | | | | | | | | SPRINGS | | CONTROL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GOVERNOR | | SPEED | | | | GEARSET | | | | | | | | | | | | |
| Type | Drive | Motor in r.p.m. | Truck in m.p.h. | Carburetor Make | Lubrication | Clutch Type | Type | Location | Speeds | Total Gear Reduction in High | Final Drive | Torque Taken By | Propulsion Taken By | Front | Rear | Steer | Levers | Name and Mode |
| none | none | ... | ... | Schebler | circ-spl | none | elec | amid | 2 | 28.00 -1 | int-g-f | rad-rd. | rad-rd. | f-ell. | r-ell. | right | right | A & B |
| none | none | ... | ... | Schebler | circ-spl | none | elec | amid | 2 | 28.00 -1 | int-g-f | rad-rd. | rad-rd. | f-ell. | r-ell. | right | right | A & B |
| cent | motor | 1,200 | 17 | Rayfield | spl-press | dry-d | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | f-ell. | r-ell. | left | cent | Acme |
| cent | motor | 2,200 | 25 | Zenith | circ-spl | dry-d | selec | unit-j | 3 | 7.45 -1 | dbl chn | | rad-rd. | f-ell. | r-ell. | left | cent | Adams A |
| cent | motor | 2,200 | 20 | Zenith | circ-spl | dry-d | selec | unit-j | 3 | 7.45 -1 | dbl chn | | rad-rd. | f-ell. | r-ell. | left | cent | Adams D |
| cent | motor | 2,200 | 18 | Zenith | circ-spl | dry-d | selec | unit-j | 3 | 8.40 -1 | dbl chn | | rad-rd. | f-ell. | r-ell. | left | cent | Adams E |
| none | none | 1,600 | 18 | Schebler | circ-spl | dry-d | selec | unit-m | 3 | 8.00 -1 | dbl chn | | rad-rd. | f-ell. | r-ell. | left | cent | Armleder HC |
| none | none | 1,600 | 16 | Schebler | circ-spl | dry-d | selec | unit-m | 3 | 9.00 -1 | top worm | springs | rad-rd. | f-ell. | r-ell. | left | cent | Armleder HW |
| none | none | 1,600 | 16 | Schebler | circ-spl | dry-d | selec | unit-m | 3 | 9.00 -1 | dbl chn | | rad-rd. | f-ell. | r-ell. | left | cent | Armleder EC |
| none | none | 1,800 | 13 | Schebler | circ (pl) | dry-d | selec | unit-m | 3 | 8.75 -1 | top worm | springs | rad-rd. | f-ell. | r-ell. | left | cent | Armleder HW |
| cent | motor | 1,200 | 16½ | Zenith | circ-spl | dry-d | selec | unit-m | 4 | 7.75 -1 | top worm | springs | springs | f-ell. | r-ell. | right | right | Atterbury 4B |
| cent | motor | 1,200 | 15½ | Zenith | circ-spl | dry-d | selec | unit-m | 4 | 6.50 -1 | top worm | springs | springs | f-ell. | r-ell. | right | right | Atterbury 4C |
| cent | motor | 1,125 | 13 | Zenith | circ-spl | dry-d | selec | unit-m | 4 | 10.30 -1 | top worm | springs | springs | f-ell. | r-ell. | right | right | Atterbury 6D |
| none | none | 1,800 | 25 | Stromberg | splash | dry-p | prog | amid | 3 | 7.10 -1 | double-rd. | springs | springs | f-ell. | plat. | right | right | Autocar 21F |
| cent | motor | 1,200 | 18 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 7.00 -1 | top worm | springs | springs | f-ell. | r-ell. | left | cent | Available |
| cent | motor | 1,200 | 15 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | f-ell. | r-ell. | left | cent | Available |
| cent | motor | 1,200 | 14 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 10.33 -1 | top worm | springs | rad-rd. | f-ell. | r-ell. | left | cent | Available |
| cent | motor | 1,200 | 15 | Rayfield | spl-press | dry-d | selec | unit-m | 3 | 7.75 -1 | dbl chn | | rad-rd. | f-ell. | r-ell. | left | cent | Avery C |
| cent | motor | 1,200 | 14½ | Rayfield | spl-press | dry-d | selec | unit-j | 3 | 8.50 -1 | dbl chn | | rad-rd. | f-ell. | r-ell. | right | cent | Avery B |
| cent | motor | 1,200 | 13 | Rayfield | spl-press | dry-d | selec | unit-j | 3 | 3.50 -1 | dbl chn | | rad-rd. | f-ell. | r-ell. | right | cent | Avery B |
| cent | motor | 1,200 | 12 | Rayfield | spl-press | dry-d | selec | unit-j | 3 | 3.50 -1 | dbl chn | | rad-rd. | f-ell. | r-ell. | right | cent | Avery A |
| cent | motor | 1,000 | 10 | Schebler | spl-press | wet-d | selec | unit-j | 3 | 12.50 -1 | dbl chn | | rad-rd. | f-ell. | r-ell. | right | cent | Avery B |
| none | none | 1,500 | 27 | Stromberg | spl-press. | dry-p | selec | unit-m | 4 | ... | top worm | springs | springs | f-ell. | r-ell. | left | cent | Barker U |
| none | none | 1,500 | 20 | Stromberg | spl-press. | dry-p | selec | unit-m | 4 | ... | top worm | springs | springs | f-ell. | r-ell. | left | cent | Barker V |
| none | none | 1,500 | 25 | Bauer | circ-spl | wet-d | selec | unit-m | 3 | ... | double-rd. | tor-arm. | tor-arm. | f-ell. | ellip. | left | cent | Bauer A |
| none | none | 1,500 | 25 | Bauer | circ-spl | wet-d | selec | unit-m | 3 | ... | double-rd. | tor-arm | tor-arm | f-ell. | r-ell. | left | cent | Bauer B |
| none | none | ... | 31 | Rayfield | circ-spl | dry-d | selec | unit-m | 3 | 6.50 -1 | top worm | springs | springs | f-ell. | r-ell. | left | cent | Bassemer G |
| cent | motor | 1,140 | 16½ | Rayfield | circ-spl | cone | selec | amid | 3 | 7.20 -1 | dbl chn | | rad-rd. | f-ell. | plat. | left | cent | Bassemer A |
| cent | motor | 1,140 | 15 | Rayfield | circ-spl | cone | selec | amid | 3 | 7.75 -1 | top worm | springs | springs | f-ell. | r-ell. | left | cent | Bassemer D |
| cent | motor | 1,000 | 12 | Rayfield | circ-spl | cone | selec | amid | 3 | 10.33 -1 | top worm | springs | rad-rd. | f-ell. | r-ell. | left | cent | Bassemer E |
| cent | motor | 1,100 | 15 | Schebler | circ-spl | cone | ind-c | amid | 3 | 7.67 -1 | top worm | sub-f | sub-f | f-ell. | r-ell. | right | right | Blair 2C |
| cent | motor | 1,100 | 14 | Schebler | circ-spl | cone | ind-c | amid | 3 | 8.67 -1 | top worm | sub-f | sub-f | f-ell. | r-ell. | right | right | Blair 2D |
| cent | motor | 1,000 | 12 | Schebler | circ-spl | cone | ind-c | amid | 3 | 9.33 -1 | top worm | sub-f | sub-f | f-ell. | r-ell. | right | right | Blair 2E |
| cent | motor | 1,100 | 10 | Schebler | circ-spl | cone | ind-c | amid | 3 | 10.40 -1 | top worm | sub-f | sub-f | f-ell. | r-ell. | right | right | Blair 2F |
| dry | ... | 1,200 | 18 | Schebler | circ-spl | wet-d | selec | unit-m | 3 | 6.00 -1 | int-g-f. | tor-arm | tor-arm. | f-ell. | r-ell. | left | cent | Ballstrom A |
| none | none | 1,500 | 30 | Carter | circ-spl. | none | fric | unit-j | 3 | 4.00 -1 | dbl chn | | rad-rd. | f-ell. | r-ell. | left | left | Brazie Packet |
| none | none | 1,200 | 30 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 6.20 -1 | top worm | springs | springs | f-ell. | r-ell. | left | cent | Brinton H |
| cent | motor | 1,200 | 38 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 5.75 -1 | top worm | springs | springs | f-ell. | r-ell. | left | cent | Brinton F |
| cent | motor | 1,300 | 15 | Schebler | circ-spl | cone | selec | unit-j | 3 | 8.25 -1 | dbl chn | | rad-rd. | f-ell. | plat. | left | cent | Brockway H |
| cent | motor | 1,300 | 15 | Schebler | circ-spl | dry-d | selec | unit-m | 3 | 8.67 -1 | top worm | springs | springs | f-ell. | r-ell. | left | cent | Brockway J |
| cent | motor | 1,300 | 15 | Schebler | circ-spl | cone | selec | unit-j | 3 | 8.25 -1 | dbl chn | | rad-rd. | f-ell. | r-ell. | left | cent | Brockway I |
| cent | motor | 1,300 | 15 | Schebler | circ-spl | dry-d | selec | unit-m | 3 | 8.67 -1 | top worm | springs | springs | f-ell. | r-ell. | left | cent | Brockway K |
| none | none | 1,750 | 30 | Marvel | circ-spl | none | selec | unit-m | 3 | 6.00 -1 | bevel | tor-t. | tor-t. | f-ell. | ellip. | left | cent | Buick D4 |
| ... | ... | 1,200 | 15 | Zenith | spl-press. | none | selec | unit-m | 3 | 8.50 -1 | int-gear | springs | springs | f-ell. | r-ell. | right | cent | Burford O |
| ... | ... | 1,000 | 13 | Zenith | spl-press | dry-d | selec | amid | 4 | 8.75 -1 | top worm | springs | rad-rd. | f-ell. | r-ell. | right | right | Burford D |
| cent | motor | 1,200 | 20 | Holley | spl-press | dry-p | selec | unit-m | 3 | 6.75 -1 | top worm | springs | springs | f-ell. | r-ell. | left | cent | Chase A |
| cent | motor | 1,200 | 18 | Holley | circ-spl | dry-d | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | f-ell. | r-ell. | right | cent | Chase R |
| cent | motor | 1,200 | 14 | Holley | circ-spl | dry-d | selec | unit-m | 4 | 9.25 -1 | top worm | springs | springs | f-ell. | r-ell. | right | cent | Chase O |
| cent | motor | 1,000 | 15 | Schebler | pressure | dry-p | selec | unit-m | 3 | ... | top worm | springs | springs | ellip. | r-ell. | right | right | Coleman J |
| cent | motor | 1,000 | 13 | Schebler | pressure | cone | selec | unit-j | 3 | ... | dbl chn | | rad-rd. | ellip. | plat. | right | right | Coleman H |
| none | none | ... | 30 | Breese | circ-spl | cone | selec | unit-m | 3 | 6.00 -1 | bevel | tor-arm | springs | f-ell. | r-ell. | left | cent | Commerce N |
| cent | motor | 1,150 | 12 | Stromberg | pressure | none | elec | unit-m | 2 | ... | int-g-f | springs | rad-rd | f-ell. | r-ell. | left | cent | C T |
| cent | motor | 1,350 | 10 | Stromberg | pressure | none | elec | unit-m | 2 | ... | int-g-f | springs | rad-rd | f-ell. | r-ell. | left | cent | C T |
| cent | motor | 1,350 | 10 | Stromberg | pressure | none | elec | unit-m | 2 | ... | int-g-f | springs | rad-rd | f-ell. | r-ell. | left | cent | C T Tractor |
| cent | motor | ... | ... | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | f-ell. | r-ell. | left* | cent | Continental (C) FL |
| cent | motor | ... | ... | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 9.25 -1 | top worm | springs | springs | f-ell. | r-ell. | left* | cent | Continental (C) HL |
| cent | motor | ... | ... | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 9.25 -1 | top worm | springs | springs | f-ell. | r-ell. | left* | cent | Continental (C) J |
| cent | motor | ... | 18 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 10.50 -1 | top worm | springs | springs | f-ell. | r-ell. | left* | cent | Continental (C) M |
| cent | motor | 1,100 | 15 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | f-ell. | r-ell. | left | cent | Corbitt B |
| cent | motor | 1,100 | 15 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 8.67 -1 | top worm | springs | springs | f-ell. | r-ell. | left | cent | Corbitt A |

**ABBREVIATIONS:** (continued). **Governor Type,** cent, *centrifugal*; l-h, *lever-ball*; mot, *motion*; hyd, *hydraulic*; elec, *electric*. **Governor Drive,** motor, *from motor*; d-shaft, *from driving shaft*; f-wheel, *from front wheel*; chaplain, *from both the motor and driving shaft by overrunning clutches*. **Lubrication,** splash, *non-circulating or simple splash*; circ-spl, *circulating splash*; spl-press, *splash-pressure*; fuel-inj, *fuel injection, oil mixed with fuel*; pressure, *pressure feed, no splash*. **Clutch Type,** dry-p, *dry plate*; dry-d, *dry multiple disk*; wet-d, *wet disk or disk-in-oil*; wet-p, *wet plate or pt to-in-oil*; r-cone, *reversed cone or inverted cone*; cont-b, *contracting band*; exp-e, *expanding shoe*. **Gearset Type,** prog, *progressive sliding gear*; selec, *selective sliding gear*; plan, *planetary*; ind-c, *constant-mesh, individual-clutch*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-s, *unit with axle*. **Gearset Speeds,** inf, *infinite number*. **Final Drive,** int-g, *int-gear*; internal-gear, *sing chn, single chain*; dbl chn, *double chain*; doub-rd, *double reduction*; spur-g, *spur gears*; sp-bev, *spiral bevel*; 1, *front wheel or wheels*; 4, *four-wheel driven*. **Torque Taken By,** rad-rd, *radius rods*; tor-arm, *torque arm*; tor-t, *torsion tube*; sub-f, *sub-frame*. **Propulsion Taken By,** rad-rd, *radius rod*; tor-t, *torsion tube*; tor-arm, *torque arm*; sub-f, *sub-frame*. **Springs,** ellip, *elliptic*; f-ell, *half elliptic*; 1-ell, *quarter elliptic*; 3-ell, *three-quarters elliptic*; plat, *platform*; cant, *cantilever*. **Control Levers,** cent, *center*; r & r, *pantshift center, brake right*; r & l, *pantshift center, brake left*.

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# Specifications of Four Hundred Eight American

| Name and Model | Capacity in Pounds | Price of Chassis | Wheelbase in Inches | Kind | TIRES: Sizes in Inches, Front | TIRES: Sizes in Inches, Rear | TIRES: Location | No. of Cylinders | No. of Crankshaft Bearings | Bore and Stroke | MOTOR: N.A.C.C. Hp. | MOTOR: Cylinders Cast | MOTOR: Valves Placed | MOTOR: Cooling: Water Circulation | MOTOR: Cooling: Radiator Core and Case | MOTOR: Ignition: Type | MOTOR: Ignition: Make | MOTOR: Ignition: Spark Advance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Couple-Gear..... HC | 7,000 | 4,800 | 144 | solid | 36x4d | 36x4d | under fr. | 4 | 5 | 5⅞x8 | 53.00 | sing. | opp | gear | cell-sheet | dual | Mea. | fixed |
| Couple-Gear..... AC | 10,000 | 5,200 | 144 | solid | 36x5d | 36x5d | under fr. | 4 | 5 | 5⅞x8 | 53.00 | sing. | opp | gear | cell-sheet | dual | Mea. | fixed |
| Crece..... 16 | 1,000 | 800 | 104 | pneu | 32x4 | 32x4 | under hood | 4 | 2 | 3⅛x5 | 16.92 | block | right | cent | sq-tubet | sing. | Bosch | hand |
| Crece..... | 2,000 | 1,900 | 120 | solid | 36x4 | 36x4 | btw seats | 4 | 3 | 4 x5 | 25.60 | block | right | cent | sq-t-cast | sing. | Bosch | hand |
| Crece..... | 3,000 | 2,600 | 130 | solid | 36x5 | 36x6 | btw seats | 4 | 3 | 4 x5 | 25.60 | block | right | cent | sq-t-cast | sing. | Bosch | hand |
| Crowther..... 16-30 | 1,000 | 600 | 110 | pneu | 32x3½ | 33x4 | under hood | 4 | 3 | 3⅞x4½ | 22.50 | block | right | thermo | fin-sheet | sing. | Dixie | hand |
| Dart..... BB | 1,500 | 1,300 | 124 | solid | 36x3 | 36x4 | under hood | 4 | 3 | 3⅛x5½ | 19.61 | block | right | thermo | cell-sheet | sing. | Eisemann | fixed |
| Dart..... B | 2,000 | 1,400 | 134* | solid | 36x3 | 36x3½ | under hood | 4 | 3 | 3⅛x5½ | 19.61 | block | right | thermo | sq-t-cast | sing. | Eisemann | fixed |
| Dart..... C | 4,000 | 1,900 | 144* | solid | 34x4 | 34x3½d | under hood | 4 | 3 | 4⅛x5 | 27.20 | block | right | cent | cell-sheet | sing. | Eisemann | fixed |
| Dart..... CC | 5,000 | 2,100 | 150 | solid | 36x4 | 36x4d | under hood | 4 | 3 | 4⅛x5½ | 27.20 | block | right | cent | cell-sheet | sing. | Eisemann | fixed |
| Dayton..... U | 4,000 | 2,650 | 118½ | solid | 36x4 | 36x3½d | under seats | 4 | 3 | 4⅛x5 | 29.00 | pair | opp | cent | fin-cast | dual | Bosch | hand |
| Dayton..... A | 7,000 | 3,400 | 138 | solid | 36x5 | 36x5 | under seats | 4 | 3 | 4⅛x5½ | 36.15 | pairs | opp | cent | fin-cast | dual | Bosch | hand |
| Dayton..... B | 10,000 | 4,500 | 148 | solid | 36x6 | 42x5d | under seats | 4 | 3 | 5⅛x7 | 44.20 | pairs | opp | cent | fin-cast | dual | Bosch | hand |
| Dayton..... E | 15,000 | 4,950 | 148 | solid | 36x7 | 42x6d | under seats | 4 | 3 | 5⅛x7 | 44.20 | pairs | opp | cent | fin-cast | dual | Bosch | hand |
| DeKalb..... D1 | 3,000 | 1,950 | 134* | solid | 34x3½ | 36x3 | under hood | 4 | 3 | 4⅛x5 | 27.20 | block | left | cent | fin-sheet | sing. | Eisemann | hand |
| DeKalb..... D2 | 5,000 | 2,450 | 138* | solid | 36x4 | 36x6 | under hood | 4 | 3 | 4⅛x5½ | 27.20 | block | left | cent | fin-sheet | sing. | Eisemann | hand |
| Denby..... U | 1,500 | 890* | 119 | solid | 34x3 | 34x3½ | under hood | 4 | 3 | 3⅛x4 | 15.64 | block | right | thermo | sq-t-sheet | sing. | Dixie | fixed |
| Denby..... B | 2,000 | 1,475 | 120 | solid | 34x3½ | 34x5 | under hood | 4 | 3 | 3⅛x5 | 19.61 | block | right | thermo | sq-t-cast | sing. | Eisemann | fixed |
| Denby..... D | 3,000 | 1,665 | 130 | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 3⅞x5 | 22.50 | block | right | thermo | sq-t-cast | sing. | Eisemann | fixed |
| Denby..... E | 4,000 | 1,845 | 144* | solid | 36x4 | 36x6 | under hood | 4 | 3 | 3⅞x5 | 22.50 | block | right | thermo | sq-t-cast | sing. | Eisemann | fixed |
| Detroit..... B | 1,000 | | 113 | pneu | 32x3½ | 32x3½ | under hood | 4 | 3 | 3⅛x4½ | 22.50 | block | left | thermo | cell-sheet | sing. | Dixie | hand |
| Diamond-T..... JA-JB | 1,500 | 1,175 | 126* | solid | 36x3 | 36x3½* | under hood | 4 | 3 | 3⅛x5 | 19.61 | block | right | thermo | fin-sheet | sing. | Bosch | hand |
| Diamond-T..... J2 | 3,000 | 2,050 | 160* | solid | 36x3½ | 36x5 | under hood | 4 | 2 | 4⅛x5½ | 27.20 | block | left | cent | sq-t-sheet | sing. | Bosch | fixed |
| Diamond-T..... J3 | 4,000 | 2,200 | 160* | solid | 34x4 | 34x6 | under hood | 4 | 3 | ..... | ..... | block | left | cent | sq-t-sheet | sing. | Bosch | fixed |
| Diamond-T..... L | 7,000 | 3,300 | 156* | solid | 36x5 | 38x5d | under hood | 4 | 3 | 4⅛x5½ | 32.40 | pairs | left | cent | sq-t-sheet | sing. | Bosch | hand |
| Dispatch..... L | 1,200 | 900 | 120 | pneu | 36x3½ | 36x3½ | under hood | 4 | 3 | 3⅛x5 | 22.50 | block | left | thermo | cell-sheet | sing. | Bosch | hand |
| Doane..... | 12,000 | 4,500-c | 178 | solid | 36x6 | 38x6d | under hood | 4 | 3 | 4⅛x6½ | 36.15 | pairs | left | cent | fin-cast | dual | Bosch | hand |
| Dorris..... 1A4 | 1,500 | 1,900 | 144* | pneu | 36x4½ | 36x4½ | under hood | 4 | 3 | 4⅛x5 | 30.65 | pairs | head | cent | cell-sheet | dual | Westinghouse | auto-h |
| Dorris..... 1A W | 3,000 | 2,500 | 162* | solid | 36x4 | 36x6d | under hood | 4 | 3 | 4⅛x5 | 30.65 | pairs | head | cent | cell-cast | dual | Bosch | hand |
| Duplex..... C | 4,000 | 2,800 | 130* | solid | 36x4 | 36x4 | under hood | 4 | 3 | 4⅛x5½ | 27.20 | block | right | cent | fin-sheet | sing. | Bosch* | |
| Duplex..... E | 4,000 | 3,000 | 130* | solid | 36x6 | 36x6 | under hood | 6 | 3 | 4⅛x5 | 29.00 | block | right | cent | fin-sheet | dual | Bosch* | hand |
| Duplex..... D | 6,000 | 3,800 | 130* | solid | 36x5 | 36x5 | under hood | 4 | 3 | 4⅛x5½ | 29.00 | block | right | cent | fin-sheet | sing. | Bosch* | |
| Duryea..... | 1,000 | 600 | 84 | solid | 38x1½ | 42x1½ | under body | 2 | 4 | 3⅛x3½ | ..... | sing. | 2-cyc | air | none | sing. | Bosch | hand |
| Dominion..... Tractor | 12,000 | 3,200 | 90 | solid | 36x4 | 36x6d | btw seats | 4 | 3 | 4⅛x5½ | 36.15 | pairs | opp | cent | fin-cast | sing. | Connecticut | hand |
| Falcon..... A | 1,000 | 715 | 106 | pneu | 31x4 | 31x4 | under hood | 4 | ..... | 3 x4 | 14.40 | block | head | thermo | cell-sheet | sing. | | auto |
| Fargo..... K | 2,000 | 1,175 | 130 | solid | 36x3 | 36x4 | under hood | 4 | 3 | 3⅞x5 | 22.50 | block | left | thermo | fin-sheet | sing. | Bosch | hand |
| Fargo..... N | 4,000 | 1,575 | 156 | solid | 36x4 | 36x6 | under hood | 4 | 3 | 4⅛x5½ | 27.20 | block | left | cent | fin-sheet | dual | Bosch | hand |
| Federal..... M | 3,000 | 1,800 | 144* | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 4⅛x5½ | 27.20 | block | left | cent | cell-cast | sing. | Eisemann | fixed |
| Federal..... L | 7,000 | 2,400 | 156 | solid | 38x3 | 38x5 | under hood | 4 | 3 | 4⅛x5½ | 32.40 | pairs | left | cent | cell-cast | sing. | Eisemann | fixed |
| F.W.D..... C | 3,000 | 2,600 | 124 | solid | 36x4 | 36x4 | under seats | 4 | 3 | 4⅛x5 | 32.40 | pairs | opp | cent | sq-t-sheet | sing. | Bosch | hand |
| F.W.D..... B | 6,000 | 4,000 | 124 | solid | 36x6 | 36x6 | under seats | 4 | 3 | 4⅞x5½ | 36.15 | pairs | opp | cent | sq-t-sheet | sing. | Eisemann | hand |
| F.W.D..... M | 10,000 | 4,800 | 148 | solid | 38x5d | 38x5d | under seats | 4 | 3 | 5⅛x7 | 44.20 | pairs | opp | cent | sq-t-cast | sing. | Bosch | hand |
| Gabriel..... H | 1,500 | 1,600 | 126 | pneu | 34x4½ | 34x4½ | under hood | 4 | 3 | 4⅛x5½ | 27.20 | block | left | cent | s-a-t-sheet | sing. | Bosch | hand |
| Gabriel..... G | 2,000 | 1,850 | 138 | pneu | 36x5 | 36x5 | under hood | 4 | 3 | 4⅛x5½ | 27.20 | block | left | cent | s-a-t-sheet | sing. | Bosch | hand |
| Gabriel..... M | 3,000 | 2,200 | 144 | pneu | 36x5 | 36x5d | under hood | 4 | 3 | 4⅛x5½ | 37.30 | block | left | cent | s-a-t-sheet | sing. | Bosch | hand |
| Garford..... 64 | 1,500 | 1,350 | 120 | p & a | 34x4½ | 36x3½ | under hood | 4 | 3 | 3⅛x5½ | 19.61 | block | right | thermo | cell-sheet | sing. | Dixie | hand |
| Garford..... 75 | 2,000 | 1,450 | 126 | p & a | 34x4½ | 36x4 | under hood | 4 | 3 | 3⅛x5½ | 19.61 | block | right | thermo | cell-sheet | sing. | Dixie | hand |
| Garford..... 66 | 3,000 | 1,950 | 142* | solid | 36x3½ | 36x4½ | under hood | 4 | 3 | 3⅞x5½ | 22.50 | block | right | cent | cell-sheet | sing. | Dixie | hand |
| Garford..... 70 | 4,000 | 2,300 | 142* | solid | 36x4 | 36x4d | under hood | 4 | 3 | 4⅛x5½ | 29.00 | block | right | cent | cell-sheet | sing. | Dixie | hand |
| Garford..... D | 10,000 | 4,300 | 148 | solid | 36x6 | 40x6d | btw seats | 4 | 3 | 4⅞x5½ | 36.15 | pairs | opp | cent | cell-sheet | sing. | Dixie | hand |
| Garford..... F | 12,000 | 4,500 | 128* | solid | 36x6 | 40x7d | btw seats | 4 | 3 | 5 1/10x5½ | 41.61 | pairs | opp | cent | cell-sheet | sing. | Dixie | hand |
| G. A. Schacht..... | 4,000 | 2,800 | 138* | solid | 38x3½ | 40x3½d | under hood | 4 | 3 | 4⅛x5½ | 29.00 | block | r & h | cent | cell-sheet | sing. | Eisemann | hand |
| G. A. Schacht..... | 6,000 | 3,200 | 168* | solid | 38x4 | 38x5d | under hood | 4 | 3 | 4⅛x5½ | 29.00 | block | r & h | cent | cell-sheet | sing. | Eisemann | hand |
| Gerain..... C | 5,000 | 2,500 | 148* | solid | 36x4 | 36x7 | under hood | 6 | 4 | 3⅛x5½ | 33.75 | block | left | cent | sq-t-cast | sing. | battery | fixed |
| G.M.C..... 15 | 1,500 | 1,000 | 122 | pneu | 35x5 | 35x5 | under hood | 4 | 3 | 3⅛x5 | 19.61 | block | right | cent | fin-sheet | sing. | Eisemann | hand |
| G.M.C..... 25 | 2,500 | 1,400 | 144* | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 3⅞x5 | 22.50 | block | right | cent | fin-cast | sing. | Eisemann | hand |
| G.M.C..... 26 | 2,500 | 1,900 | 144* | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 3⅞x5 | 22.50 | block | right | cent | fin-cast | sing. | Eisemann | hand |
| G.M.C..... 31 | 3,000 | 1,900 | 144* | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 3⅞x5 | 22.50 | block | right | cent | fin-cast | sing. | Eisemann | hand |
| G.M.C..... 40 | 4,000 | 2,375 | 158* | solid | 36x4 | 36x6d | under hood | 4 | 3 | 4⅛x5 | 29.00 | block | right | cent | fin-cast | sing. | Eisemann | hand |
| G.M.C..... 41 | 4,000 | 2,375 | 158* | solid | 36x4 | 36x6d | under hood | 4 | 3 | 4⅛x5½ | 27.20 | block | right | cent | fin-cast | sing. | Eisemann | hand |
| G.M.C..... 70 | 7,000 | 3,175 | 163* | solid | 36x5 | 40x5d | under hood | 4 | 3 | 4⅛x5½ | 32.40 | pairs | left | cent | fin-cast | sing. | Eisemann | hand |
| G.M.C..... 71 | 7,000 | 3,175 | 163* | solid | 36x5 | 40x5d | under hood | 4 | 3 | 4⅛x5½ | 32.40 | pairs | left | cent | fin-cast | sing. | Eisemann | hand |
| G.M.C..... 100 | 10,000 | | 163* | solid | 36x6 | 40x6d | under hood | 4 | 3 | 4⅛x5½ | 32.40 | pairs | left | cent | fin-cast | sing. | Eisemann | hand |
| G.M.C..... 101 | 10,000 | | 163* | solid | 36x6 | 40x6d | under hood | 4 | 3 | 4⅛x5½ | 32.40 | pairs | left | cent | fin-cast | dual | Bosch | hand |
| Geneva..... 1 | 1,500 | | 96 | solid | 34x2 | 36x2½ | under hood | 2 | 2 | 5⅛x4½ | 22.10 | sing. | head | gear | fin-cast | sing. | Simms | fixed |
| Gramm-Bernstein..... | 2,000 | 1,500 | 118 | solid | 34x3 | 34x4 | under hood | 4 | 3 | 3⅛x5½ | 19.61 | block | right | thermo | fin-cast | sing. | Bosch | hand |
| Gramm-Bernstein..... | 2,000 | 1,800 | 130* | solid | 34x3½ | 36x4 | under hood | 4 | 3 | 3⅛x5½ | 19.61 | block | right | thermo | fin-cast | sing. | Bosch | hand |
| Gramm-Bernstein..... | 3,000 | 2,600 | 156 | solid | 36x4 | 36x4d | under hood | 4 | 3 | 4⅛x5½ | 29.60 | pairs | left | cent | fin-cast | dual | Bosch | hand |
| Gramm-Bernstein..... | 7,000 | 3,400 | 168 | solid | 36x5 | 40x5d | under hood | 4 | 3 | 4⅛x5½ | 29.60 | pairs | left | cent | fin-cast | dual | Bosch | hand |
| Gramm-Bernstein..... | 12,000 | 4,300 | 168* | solid | 36x6 | 40x6d | under hood | 4 | 3 | 4⅛x6 | 32.40 | pairs | left | cent | fin-cast | dual | Bosch | hand |

**ABBREVIATIONS: General.** ** with other options; opt, optional.* **Price.** *-c, complete with body.* **Tires. Kind.** *Pneu, pneumatic; C-pub, cushion; p & a, pneumatic in front and solid in rear, r & h, solid in front and steel in rear.* **Tire Sizes.** *d, dual.* **Motor Location.** *btw seats, between seats, under fr, under four.* **Cylinders Cast.** *sing, singly or individually.* **Location of Valves.** *opp, opposite or T-head type; top (two cylinder motors only), L-head cylinder last horizontal with valves up; r & h, at right and in hand, L-head cylinder; l & h, at left and in hand, L-head cylinder, 2-cyc, two-cycle motor, no valves.* **Water Circulation.** *cent, centrifugal pump; gear, gear pump; thermo, thermo-syphon circulation; air, air-cooled, no water.* **Radiator Type and Core.** *fin-sheet, flanged-tube core with sheet metal casing; fin-cast, A-core-tube core with cast aluminum casing; sq-t-sheet, square tube core with sheet metal casing; sq-t-cast, square tube core with cast aluminum casing; cell-sheet, cellular or honeycomb core with sheet metal casing; cell-cast, cellular core with cast aluminum casing; s-a-t-sheet, zig-zag tube core with sheet metal casing; s-a-t-cast, zig-zag tube core with cast aluminum casing; ring-cast, copper tube core arranged in a ring about a central hub.* **Ignition.** **on with a dual aluminum casing.* **Ignition. Type.** *mag, single; dual, double.* **Make of Magneto** *(or other sparking device). Atw, Kent, Atwater Kent.* **Spark Advance.** *auto, automatic; auto-h, automatic advance with hand adjustment; 2-pt, two-point fixed, battery circuit fixed in retard, magneto in advance*

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# Gasoline Commercial Vehicles in Tabulated Form

| MOTOR | | | | | | TRANSMISSION | | | | | | | | SPRINGS | | CONTROL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GOVERNOR | | SPEED | | | | GEARSET | | | | | | | | | | | | |
| Type | Drive | Motor in r.p.m. | Truck in m.p.h. | Carburetor Make | Lubrication | Clutch Type | Type | Location | Speeds | Total Gear Reduction in High | Final Drive | Torque Taken By | Propulsion Taken By | Front | Rear | Steer | Levers | Name and Model |
| none | none | . . . . | 15 | Stromberg | spl-press. | none | elec | unit-m | 1 | 25 00 -1 | bevel-4 | springs | rad-rd. | full. | full. | right | . . . . | Couple-Gear . . . HC |
| none | none | . . . . | 12 | Stromberg | spl-press. | none | elec | unit-m | 1 | 25 00 -1 | bevel-4 | tor-arm. | rad-rd. | full. | full. | right | . . . . | Couple-Gear . . . AC |
| none | none | 1,000 | 25 | Rayfield | cire-spl | dry-d | selec | unit-m | 3 | . . . . . | bevel | springs | springs | full. | full. | left | cent. | Croce . . . . . 16 |
| none | none | 1,000 | 15 | Rayfield | spl-press. | cone | selec | amid | 3 | . . . . . | top worm | springs | springs | full. | full. | right | right | Croce . . . . . |
| none | none | 1,000 | 15 | Rayfield | spl-press. | cone | selec | amid | 3 | . . . . . | top worm | springs | springs | full. | full. | right | right | Croce . . . . . |
| none | none | 3,000 | 36 | Mayer | pressure | none | rollers. | unit-j | 3 | . . . . . | rollers | tor-t | sub-f. | full. | full. | left | cent. | Crowther . . . . 10-30 |
| none | none | . . . . | 20 | Stromberg | spl-press. | dry-d | prog | unit-m | 3 | 3 50 -1 | top worm | springs | springs | full. | full. | left | cent. | Dart . . . . . BB |
| | | . . . . | 22 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 3 25 -1 | dbl chn. | rad-rd. | rad-rd. | full. | full. | left | cent. | Dart . . . . . B |
| | | 1,800 | 20 | Stromberg | spl-press. | cone | selec | unit-j | 3 | 5 25 -1 | dbl chn. | rad-rd. | rad-rd. | full. | full. | left | cent. | Dart . . . . . C |
| mid. | duplex | 1,800 | 17 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 7 75 -1 | top worm | springs | springs | full. | full. | left | cent. | Dart . . . . . CC |
| mid. | duplex | 1,000 | 13½ | Stromberg* | cire-spl | wet-d | selec | unit-j | 3 | 9 18 -1 | dbl chn. | rad-rd. | plat. | left | cent | Dayton | U |
| mid. | duplex | 1,000 | 11 | Stromberg* | cire-spl | wet-d | selec | unit-j | 3 | 9 40 -1 | dbl chn. | rad-rd. | plat. | left | cent | Dayton | A |
| mid. | duplex | 1,000 | 10 | Stromberg* | cire-spl | wet-d | selec | unit-j | 4 | 13 00 -1 | dbl chn. | rad-rd. | plat. | left | cent | Dayton | B |
| mid. | duplex | 1,000 | 10 | Stromberg* | cire-spl | wet-d | selec | unit-j | 4 | 13 00 -1 | dbl chn. | rad-rd. | plat. | left | cent | Dayton | E |
| mid. | motor | 1,162 | 18 | Stromberg | spl-press. | dry-d* | selec | amid* | 3 | 6 83 -1 | top worm* | springs | springs* | full. | full. | left | cent | DeKalb . . . . D1 |
| mid. | motor | 1,160 | 14 | Stromberg | spl-press. | dry-d* | selec | amid* | 3 | 8 25 -1 | top worm* | springs | springs* | full. | full. | left | cent | DeKalb . . . . D2 |
| mid. | motor | 1,600 | 20 | Denby | cire-spl | dry-p | selec | unit-m | 3 | 8 20 -1 | int-gear | springs | springs | full. | full. | left | cent | Denby . . . . U |
| mid. | motor | 1,375 | 18 | Stromberg | cire-spl | dry-p | selec | unit-m | 3 | 7 40 -1 | int-gear | springs | springs | full. | full. | c & l. | cent | Denby . . . . B |
| mid. | motor | 1,327 | 15 | Stromberg | cire-spl | dry-p | selec | unit-m | 3 | 9 44 -1 | int-gear | springs | springs | full. | full. | left | cent | Denby . . . . D |
| mid. | motor | 1,327 | 14 | Stromberg | cire-spl | dry-p | selec | unit-m | 3 | 9 46 -1 | int-gear | springs | springs | full. | full. | left | cent | Denby . . . . E |
| none | none | 3,800 | 58 | opt | cire-spl | wet-d | selec | unit-m | 3 | 4 25 -1 | bevel | tor-arm | springs | full. | cant | left | cent | Detroit . . . . B |
| none | none | 1,500 | 23 | Rayfield | cire-spl | dry-d | selec | unit-m | 3 | 7 00 -1* | top worm | springs | springs | full. | full. | left | | Diamond-T . . . JA-JB |
| mid. | motor | 1,200 | 14 | Rayfield | cire-spl | dry-d | selec | unit-m | 3 | 7 75 -1 | top worm | springs | springs | full. | full. | right | | Diamond-T . . . J2 |
| mid. | motor | 1,200 | 14 | | cire-spl | dry-d | selec | unit-m | 3 | 7 75 -1 | top worm | springs | springs | full. | full. | right | | Diamond-T . . . J3 |
| mid. | motor | . . . . | . . . . | Rayfield | cire-spl | dry-d | selec | unit-m | 4 | 8 75 -1 | top worm | springs | rad-rd. | full. | full. | right | | Diamond-T . . . L |
| mid. | motor | 1,300 | 25 | Rayfield | pressure | none | fric | unit-j | 4 | 3 12 -1 | dbl chn | rad-rd. | ellip. | ellip. | right | right | Dispatch . . . . 1 |
| | | 1,000 | 10 | Schebler | cire-spl | dry-d | selec | unit-m | 3 | 10 50 -1 | dbl chn | rad-rd. | full. | full. | right | cent | Doane . . . . . |
| none | none | 1,143 | 30 | Stromberg | cire-spl | dry-d | selec | unit-m | 3 | 6 08 -1 | bevel | tor-arm | springs | full. | plat. | left | cent. | Durria . . . . 1A4 |
| mid. | motor | 1,083 | 15 | Stromberg | cire-spl | dry-d | selec | unit-m | 3 | 7 75 -1 | top worm | springs | springs | full. | full. | left | cent | Durria . . . . 1AW |
| mid. | duplex | 1,500 | 20 | Schebler | cire-spl | dry-d | selec | unit-m | 4 | 8 00 -1 | int-g-4 | tor-arm. | rad-rd. | full. | full. | left | cent | Duplex . . . . C |
| mid. | duplex | 1,260 | 12 | Schebler | cire-spl | dry-d | selec | unit-m | 4 | 8 00 -1 | int-g-4 | tor-arm. | rad-rd. | full. | full. | left | cent | Duplex . . . . E |
| mid. | duplex | 1,250 | 10 | Schebler | cire-spl | dry-d | selec | unit-m | 4 | 9 00 -1 | int-g-4 | tor-arm. | rad-rd. | full. | full. | left | cent | Duplex . . . . D |
| none | none | 3,000 | 30 | Kingston | fuel-inj | none | rollers. | unit-m | 2 | 10 00 -1 | rollers | sub-f. | sub-f. | full. | full. | left | cent | Durryea . . . . |
| mid. | motor | 1,000 | 9 | Schebler | pressure | dry-d | selec | unit-m | 3 | . . . . . | top worm | springs | springs | full. | full. | left | c & l | Dominion . . . . Tractor |
| none | none | 2,600 | 30 | Zenith | cire-spl | none | selec | unit-m | 3 | 5 00 -1 | bevel | . . . . | rad-rd. | full. | plat. | left | cent | Falcon . . . . A |
| none | none | 1,100 | 18 | Rayfield | spl-press. | dry-d | selec | unit-m | 3 | 6 50 -1 | int-gear | springs | springs | full. | full. | left | cent | Fargo . . . . K |
| none | none | 1,100 | 15½ | Rayfield | spl-press. | dry-d | prog | unit-m | 3 | 7 75 -1 | int-gear | springs | springs | full. | full. | left | cent | Fargo . . . . N |
| mid. | motor | 1,190 | 15 | Stromberg | cire-spl | none | selec | amid | 3 | 8 50 -1 | top worm | springs | rad-rd. | full. | full. | left | cent | Federal . . . . M |
| mid. | motor | 1,160 | 12 | Stromberg | cire-spl | none | selec | unit-m | 3 | 10 33 -1 | top worm | springs | rad-rd. | full. | full. | left | cent | Federal . . . . L |
| mid. | motor | 1,000 | 16 | Stromberg | pressure | wet-d | ind-c | amid | 3 | 9 75 -1 | bevel-4 | springs | springs | full. | plat. | right | right | F.W.D . . . . C |
| mid. | motor | 1,100 | 13 | Stromberg | spl-press. | wet-d | selec | amid | 3 | 9 00 -1 | bevel-4 | springs | springs | full. | plat. | right | right | F.W.D . . . . B |
| mid. | motor | 1,050 | 9½ | Stromberg | pressure | wet-d | selec | amid | 3 | 12 00 -1 | bevel-4 | springs | springs | full. | plat. | right | right | F.W.D . . . . M |
| none | none | 1,200 | 28 | Rayfield | cire-spl | none | selec | amid | 3 | 4 25 -1 | bevel | tor-arm. | springs | full. | full. | left | cent | Gabriel . . . . H |
| none | none | 1,200 | 21 | Rayfield | cire-spl | none | selec | amid | 4 | 5 50 -1 | top worm | springs | springs | full. | full. | left | cent | Gabriel . . . . O |
| none | none | 1,200 | 16½ | Rayfield | cire-spl | none | selec | amid | 4 | 7 25 -1 | top worm | springs | springs | full. | full. | left | cent | Gabriel . . . . M |
| mid. | motor | 1,150 | 18½ | Rayfield | cire-spl | dry-d | selec | unit-j | 3 | 6 62 -1 | dbl chn | rad-rd. | full. | full. | right | right | cent | Garford . . . . 64 |
| mid. | motor | 1,000 | 17 | Rayfield | cire-spl | dry-d | selec | unit-m | 3 | 6 50 -1 | top worm | springs | springs | full. | full. | right | cent | Garford . . . . 75 |
| mid. | motor | 1,000 | 13½ | Rayfield | cire-spl | dry-d | selec | amid | 3 | 7 75 -1 | top worm | springs | springs | full. | full. | right | | Garford . . . . 66 |
| mid. | motor | 1,000 | 13½ | Rayfield | cire-spl | dry-d | selec | amid | 3 | 7 75 -1 | top worm | springs | springs | full. | full. | right | | Garford . . . . 70 |
| mid. | motor | 1,000 | 8 | Rayfield | pressure | dry-d | selec | unit-j | 4 | 13 33 -1 | dbl chn | rad-rd. | rad-rd. | full. | full. | right | right | Garford . . . . D |
| mid. | motor | 1,000 | 8 | Rayfield | pressure | dry-d | selec | unit-j | 4 | 13 33 -1 | dbl chn | rad-rd. | rad-rd. | full. | full. | right | right | Garford . . . . F |
| mid. | motor | 1,000 | 15 | Schebler | spl-press. | none | selec | amid | 3 | 7 75 -1 | top worm | tor-arm. | rad-rd. | full. | plat. | left | | G. A. Schacht |
| mid. | motor | 1,000 | 15 | Schebler | spl-press. | none | selec | amid | 3 | 9 66 -1 | top worm | tor-t | rad-rd. | full. | plat. | left | | G. A. Schacht |
| . . . . | . . . . | 1,150 | 14 | Stromberg | spl-press. | dry-d | selec | unit-m | 4 | 8 66 -1 | top worm | springs | springs | full. | full. | left | | Garsia . . . . C |
| mid. | motor | 1,150 | 20 | Marvel | cire-spl | none | selec | amid | 3 | 6 00 -1 | bevel | tor-t | tor-t | full. | ellip. | left | cent | G.M.C . . . . 15 |
| mid. | motor | 1,300 | 16 | Marvel | cire-spl | dry-d | selec | unit-m | 4 | 8 66 -1 | dbl chn | rad-rd. | rad-rd. | full. | full. | left | cent | G.M.C . . . . 25 |
| mid. | motor | 1,300 | 16 | Marvel | cire-spl | dry-d | selec | unit-m | 4 | 8 75 -1 | top worm | springs | rad-rd. | full. | full. | left | cent | G.M.C . . . . 26 |
| mid. | motor | 1,300 | 15 | Marvel | cire-spl | dry-d | selec | unit-m | 4 | 9 25 -1 | top worm | springs | rad-rd. | full. | full. | left | cent | G.M.C . . . . 31 |
| mid. | motor | 1,200 | 14 | Marvel | spl-press. | dry-d | selec | unit-m | 4 | 9 00 -1 | dbl chn | rad-rd. | rad-rd. | full. | full. | left | cent | G.M.C . . . . 40 |
| mid. | motor | 1,200 | 14 | Marvel | spl-press. | dry-d | selec | unit-m | 4 | 9 25 -1 | top worm | springs | rad-rd. | full. | full. | left | cent | G.M.C . . . . 41 |
| mid. | motor | 1,160 | 12 | Marvel | spl-press. | dry-d | selec | amid | 4 | 10 90 -1 | dbl chn | rad-rd. | rad-rd. | full. | full. | left | cent | G.M.C . . . . 70 |
| mid. | motor | 1,210 | 12 | Marvel | spl-press. | dry-d | selec | amid | 4 | 12 00 -1 | top worm | springs | rad-rd. | full. | full. | left | cent | G.M.C . . . . 71 |
| mid. | motor | 1,160 | 9½ | Marvel | spl-press. | dry-d | selec | amid | 4 | 13 83 -1 | dbl chn | rad-rd. | rad-rd. | full. | full. | left | cent | G.M.C . . . . 100 |
| mid. | motor | 1,150 | 10 | Marvel | spl-press. | dry-d | selec | amid | 4 | 13 66 -1 | top worm | rad-rd. | rad-rd. | full. | full. | left | cent | G.M.C . . . . 101 |
| . . . . | . . . . | . . . . | 18 | Schebler | spl-press. | dry-p | plan | unit-j | 2 | . . . . . | dbl chn | rad-rd. | full. | ellip. | right | right | cent | Geneva . . . . 1 |
| mid. | motor | 1,100 | 20 | Zenith | cire-spl | dry-d | ind-c | amid | 3 | 6 50 -1 | top worm | springs | springs | full. | full. | | | Graham-Bernstein |
| mid. | motor | 1,100 | 17 | Zenith | cire-spl | dry-d | ind-c | amid | 3 | 7 75 -1 | top worm | springs | springs | full. | full. | | | Graham-Bernstein |
| mid. | motor | 1,100 | 15 | Zenith | cire-spl | dry-d | ind-c | amid | 3 | 8 66 -1 | top worm | springs | springs | full. | full. | | | Graham-Bernstein |
| mid. | motor | 1,100 | 12 | Zenith | cire-spl | dry-d | ind-c | amid | 4 | 11 25 -1 | top worm | springs | springs | full. | full. | | | Graham-Bernstein |
| mid. | motor | 1,100 | 10 | Zenith | cire-spl | dry-d | ind-c | amid | 4 | 13 00 -1 | top worm | springs | springs | full. | full. | | | Graham-Bernstein |

**ABBREVIATIONS:** (continued). **Governor Type**, cent, centrifugal; l-b, low-ball; vart, vacuum; hyd, hydraulic; elec, electric. **Governor Drive**, motor, from motor; d-shaft, from driving shaft; f-wheel, from end wheel; duplex, from both the motor and driving shaft by overrunning clutches. **Lubrication**, splash, non-circulating or simple splash; cire-spl, circulating splash; spl-press, splash-pressure; fuel-inj, fuel injection. I mixed with fuel; pressure, pressure feed, no splash. **Clutch Type**, dry-p, dry plate; dry-d, dry multiple disk; wet-d, wet disk or disk-in-oil; wet-p, wet plate or plate-in-oil; s-cone, reversed cone or inverted cone; ml-b, contracting band; exp-e, expanding shoe. **Gearset Type**, prog, progressive sliding gear; selec, selective sliding gear; plan, planetary; ind-c, constant-mesh, individual-clutch; fric, friction; elec, electric. **Gearset Location**, amid, amidships; unit-m, unit with motor; unit-j, unit with jackshaft; unit-t, unit with axle. **Gearset Speeds**, ind, infinite number. **Final Drive**, int-g, int-gear, internal-gear; ring chn, single chain; bl chn, double chain; double-red, double reduction; spur-g, spur gears; sp-bev, spiral bevel; f, front wheel or wheels; h, rear-wheel drives. **Torque Taken By**, rad-rd, radius rods; tor-arm, torque arm; tor-t, torque tube; sub-f, sub-frame. **Propulsion Taken By**, rad-rd, radius rod; tor-t, torque tube; tor-arm, torque arm; sub-f, sub-frame. **Springs**, ellip, elliptic; l-ell, half elliptic; full, quarter elliptic; 3-ell, three-quarter elliptic; plat, platform; cant, cantilever. **Control Levers**, cent, center; c & r, parabolic center, brake right; c & l, parabolic center, brake left.

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# Specifications of Four Hundred Eight American

| Name and Model | Capacity in Pounds | Chassis Price | Wheelbase in Inches | TIRES Kind | SIZES IN INCHES Front | SIZES IN INCHES Rear | Location | No. of Cylinders | No. of Crankshaft Bearings | Bore and Stroke | MOTOR N.A.C.C. Hp. | Cylinders Cast | Valves Placed | COOLING Water Circulation | COOLING Radiator Core and Case | IGNITION Type | IGNITION Make | Spark Advance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G.V. Mercedes.....FV | 12,000 | ..... | 160 | solid | 34x5 | 40x6 | under hood | 4 | 4 | 4½x5½ | 29.00 | pairs | head | cent | cell-sheet | sing | Bosch | fixed |
| Hall | 7,000 | 2,800 | 144* | solid | 36x5 | 36x5d | under hood | 4 | 5 | 4½x5½ | 32.40 | pairs | left | cent | fin-cast | sing | Bosch* | auto |
| Hall | 7,000 | 2,400 | 144* | solid | 36x5 | 40x5d | under hood | 4 | 5 | 4½x5½ | 32.40 | pairs | left | cent | fin-cast | sing | Bosch* | auto |
| Hall | 10,000 | 3,400 | 144* | solid | 36x5 | 40x6d | under hood | 4 | 5 | 4½x5½ | 32.40 | pairs | left | cent | fin-cast | sing | Bosch* | auto |
| Hanger.....B | 1,000 | 875 | 110* | pneu | 32x4 | 32x4 | under hood | 4 | 2 | 3½x5 | 16.92 | block | left | thermo | cell-sheet | sing | K-W | hand |
| Harvey.....WH | 7,000 | 2,700 | 166* | solid | 36x5 | 36x5d | under hood | 4 | 3 | 4½x5½ | 29.00 | block | right | cent | sq-t-sheet | sing | Eisemann | auto |
| Harvey.....WK | 10,000 | 3,400 | 166* | solid | 36x5 | 40x6d | under hood | 4 | 3 | 4½x6 | 32.40 | block | right | cent | sq-t-sheet | dual | Eisemann | auto |
| Henderson.....C | 1,200 | 1,100 | 106* | pneu | 34x6 | 34x6 | under hood | 4 | 3 | 3½x5 | 19.61 | block | left | thermo | fin-sheet | sing | Bosch | fixed |
| Henderson.....D | 2,000 | 1,500 | 124 | pneu* | 35x5* | 35x5* | under hood | 4 | 3 | 3½x5 | 22.50 | block | right | thermo | fin-sheet | sing | Bosch | fixed |
| Hoadley | 4,000 | 3,000 | 145 | solid | 36x4 | 36x4 | under hood | 4 | ..... | 4½x5½ | 27.20 | block | left | cent | fin-sheet | dual | Remy | hand |
| Horner.....F-G | 3,000 | ..... | 145* | solid | 36x4 | 36x6 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | fin-cast | dual | Bosch | hand |
| Horner.....F-G | 4,000 | ..... | 145* | solid | 36x4 | 36x5 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | fin-cast | dual | Bosch | hand |
| Horner.....F-G | 6,000 | ..... | 145* | solid | 36x5 | 40x4d | under hood | 4 | 3 | 4½x5½ | 32.40 | pairs | left | cent | fin-cast | dual | Bosch | hand |
| Horner.....F | 10,000 | ..... | 145* | solid | 36x6 | 42x6d | under hood | 4 | 3 | 5½x5½ | 44.20 | pairs | opp | cent | fin-cast | dual | Bosch | hand |
| Hannibal.....A | 1,000 | 550 | 106 | pneu | 30x3½ | 30x3½ | under hood | 4 | ..... | 3½x4½ | 16.92 | block | ..... | thermo | cell-sheet | sing | Atw. Kent | |
| I.H.C.....MA | 1,000 | 600c | 90 | solid* | 42x2* | 42x2* | under body | 2 | 2 | 5 x5 | 20.00 | sing | head | air | none | dual | Heinze | hand |
| I.H.C.....MW | 1,000 | 710c | 102 | solid* | 36x2* | 36x2* | under body | 2 | 2 | 4½x5 | 16.20 | sing | top | cent | fin-sheet | dual | Heinze | hand |
| I.H.C.....E | 1,500 | 950c | 102 | solid* | 40x3* | 40x3* | under body | 2 | 2 | 4½x5 | 16.20 | sing | top | cent | fin-sheet | sing | Bosch | hand |
| I.H.C.....F | 2,000 | 1,500 | 128 | solid* | 37x3* | 37x4* | under hood | 4 | 3 | 3½x5½ | 19.61 | block | right | cent | fin-sheet | sing | Bosch | hand |
| Independent.....F | 1,500 | 1,285 | 128* | solid* | 36x3* | 36x3½* | under hood | 4 | 3 | 3½x5 | 19.61 | block | right | thermo | s-a-t-sheet | sing | Eisemann | fixed |
| Independent.....G | 4,000 | 1,800 | 144 | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | right | thermo | cell-cast | sing | Eisemann | fixed |
| Indiana.....S | 2,000 | ..... | 128 | solid* | 36x3½ | 36x4 | under hood | 4 | 3 | 3½x5 | 19.61 | block | right | cent | fin-cast | sing | Bosch | fixed |
| Indiana.....D | 3,000 | ..... | 135 | solid | ..... | ..... | under hood | 4 | 3 | 4½x5 | 27.20 | pairs | right | cent | fin-cast | sing | Bosch | hand |
| Indiana.....R | 6,000 | ..... | 156 | solid | 36x5 | 36x5d | under hood | 4 | 3 | 4½x5 | 27.20 | pairs | right | cent | fin-cast | sing | Bosch | hand |
| Indiana.....L | 10,000 | ..... | 162 | solid | ..... | 40x6 | under hood | 4 | 3 | 4½x5 | 36.15 | pairs | opp | cent | fin-cast | sing | Bosch | hand |
| Jeffery.....4015 | 4,000 | 2,750 | 124 | solid | 36x5 | 36x5 | btw seats | 4 | 2 | 3½x5 | 22.50 | block | right | cent | cell-sheet | dual | Bosch | hand |
| Kearns.....L | 500 | 375 | 90 | pneu | 28x3 | 28x3 | under hood | 4 | 2 | 2½x4 | 12.68 | block | right | thermo | fin-sheet | sing | Atw. Kent | auto |
| Kearns.....D | 1,000 | 600 | 107 | pneu | 30x3½ | 30x3½ | under hood | 4 | 2 | 3½x5 | 16.92 | block | right | thermo | fin-sheet | sing | Dixie | hand |
| Kelly-Springfield.....K-30 | 2,000 | 2,000 | 130 | solid* | 36x3½* | 36x5* | under hood | 4 | 3 | 3½x5½ | 22.50 | block | left | cent | cell-sheet | sing | Eisemann | auto |
| Kelly-Springfield.....K-31 | 3,000 | 2,650 | 144* | solid | 36x3½ | 36x3½ | under hood | 4 | 3 | 3½x5½ | 22.50 | block | left | cent | cell-sheet | sing | Eisemann | auto |
| Kelly-Springfield.....K-35 | 4,000 | 2,750 | 150* | solid | 36x4 | 36x4 | under hood | 4 | 3 | 3½x5½ | 22.50 | block | left | cent | cell-sheet | sing | Eisemann | auto |
| Kelly-Springfield.....K-40 | 6,000 | 3,400 | 150* | solid | 36x5 | 40x5d | under hood | 4 | 3 | 4½x6 | 32.40 | pairs | opp | gear | cell-sheet | sing | Eisemann | auto |
| Kelly-Springfield.....K-45 | 8,000 | 3,500 | 150* | solid | 36x5 | 40x6d | under hood | 4 | 3 | 4½x6 | 32.40 | pairs | opp | cent | cell-sheet | sing | Eisemann | auto |
| Kelly-Springfield.....K-50 | 10,000 | 4,250 | 150* | solid | 36x6 | 40x6d | under hood | 4 | 3 | 4½x6 | 32.40 | pairs | opp | cent | cell-sheet | sing | Eisemann | auto |
| Kelly-Springfield.....K-60 | 12,000 | 4,500 | 150* | solid | 36x6 | 40x7d | under hood | 4 | 3 | 4½x6 | 32.40 | pairs | opp | cent | cell-sheet | sing | Eisemann | auto |
| King | 7,000 | 2,600 | 120 | solid | 36x5 | 36x5d | under flr | 4 | 3 | 4½x5½ | 32.40 | pairs | left | cent | s a-t-sheet | dual | Bosch | 2-pt |
| Kissel-car | 1,000 | 950 | 115 | pneu | 32x4 | 32x4 | under hood | 4 | 3 | 3½x5½ | 24.22 | block | right | cent | sq-t-sheet | sing | Eisemann | hand |
| Kissel-car | 2,000 | 1,500 | 135 | pneu* | 33x4½* | 33x4½* | under hood | 4 | 3 | 3½x5½ | 24.22 | block | right | cent | sq-t-sheet | sing | Eisemann | hand |
| Kissel-car | 4,000 | 2,100 | 144 | solid | 34x3½ | 36x6 | under hood | 4 | 3 | 4½x5½ | 29.00 | block | right | cent | sq-t-sheet | sing | Eisemann | hand |
| Kissel-car | 6,000 | 2,750 | 144 | solid | 36x4 | 36x4 | under hood | 4 | 3 | 4½x5½ | 32.40 | pairs | left | cent | sq-t-sheet | sing | Eisemann | hand |
| Kissel-car | 8,000 | 3,350 | 144 | solid | 36x5 | 36x5 | under hood | 4 | 3 | 4½x5 | 38.25 | pairs | left | cent | sq-t-sheet | sing | Eisemann | hand |
| Kissel-car | 12,000 | 4,350 | 165 | solid | 36x6 | 40x6d | under hood | 4 | 3 | 4½x5 | 38.25 | pairs | left | cent | sq-t-sheet | sing | Eisemann | hand |
| Kleiber.....1 | 3,000 | 2,250 | 140* | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | s-a-t-sheet | dual | Bosch | hand |
| Kleiber.....2 | 5,000 | 2,750 | 150* | solid | 36x4 | 36x6 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | s-a-t-sheet | dual | Bosch | hand |
| Kleiber.....3 | 7,000 | 3,300 | 160* | solid | 36x5 | 36x5d | under hood | 4 | 3 | 4½x5½ | 32.40 | pairs | left | cent | s-a-t-sheet | dual | Bosch | hand |
| Kleiber.....5 | 10,000 | 4,250 | 170* | solid | 36x6 | 40x6d | under hood | 4 | 3 | 5½x5½ | 44.20 | pairs | opp | cent | s-a-t-sheet | dual | Bosch | hand |
| Knickerbocker.....16 | 4,000 | 2,200 | 145* | solid | 36x4 | 36x4d | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | fin-cast | sing | Bosch | hand |
| Knickerbocker.....16 | 7,000 | 2,850 | 164* | solid | 36x5 | 36x5d | under hood | 4 | 3 | 4½x5 | 32.40 | pairs | left | cent | fin-cast | sing | Bosch | hand |
| Knox Tractor.....35 | ..... | 4,500 | 108 | solid | 36x4 | 38x6d | under hood | 4 | 3 | 5 x5½ | 40.00 | pairs | head | cent | sq-t-sheet | sing | Mea* | hand |
| Koehler.....K | 2,000 | 870 | 129 | solid | 34x3 | 34x3½ | under hood | 4 | 3 | 3½x5 | 19.61 | block | head | thermo | fin-cast | sing | opt | hand |
| Kosmath.....15 | 1,000 | 675 | 100 | pneu | 32x3½ | 31x4 | under hood | 4 | 2 | 3½x4½ | 15.65 | block | right | thermo | fin-sheet | sing | Atw. Kent* | auto* |
| Krebs.....F | 1,500 | 1,600 | 120 | pneu | 34x4½ | 34x4½ | under hood | 4 | 5 | 3½x5 | 22.50 | block | right | thermo | fin-sheet | sing | Bosch | auto |
| Krebs.....G | 2,000 | 2,000 | 144* | solid | 34x3½ | 34x4 | under hood | 4 | 5 | 3½x5 | 22.50 | block | left | cent | fin-sheet | sing | Bosch | auto |
| Krebs.....H | 4,000 | 2,450 | 144* | solid | 36x4 | 36x4 | under hood | 4 | 5 | 4½x5½ | 27.20 | block | left | cent | fin-sheet | sing | Bosch | auto |
| Krebs.....I | 6,000 | 3,100 | 162* | solid | 36x5 | 36x5d | under hood | 4 | 5 | 4½x5½ | 27.20 | block | left | cent | fin-sheet | sing | Bosch | auto |
| Lambert.....V1 | 1,000 | 900 | 106* | pneu | 30x3½ | 31x4 | under hood | 4 | 3 | 3½x4½ | 19.61 | pairs | left | cent | fin-sheet | dual | Bosch | hand |
| Lambert.....V2 | 1,500 | 1,300 | 120 | solid | 36x3½ | 36x4 | under hood | 4 | 3 | 4½x5 | 32.40 | block | left | cent | fin-sheet | dual | Bosch | hand |
| Lambert.....V3 | 4,000 | 2,000 | 120 | solid | 36x4 | 36x5 | under hood | 4 | 3 | 4½x5 | 32.40 | block | left | cent | fin-sheet | dual | Bosch | hand |
| Landshaft.....G1 | 2,000 | 1,250 | 124* | solid | 34x3½ | 36x4 | under hood | 4 | 3 | 3½x5½ | 19.61 | block | right | thermo | sq-t-sheet | sing | Swiss | hand |
| Landshaft.....J1 | 4,000 | 1,550 | 144* | solid | 34x4 | 36x4 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | right | cent | sq-t-sheet | sing | Swiss | hand |
| Lange.....C | 2,000 | 1,750 | 130* | solid | 36x3½ | 38x4 | under hood | 4 | 3 | 3½x5½ | 22.50 | block | left | thermo | cell-sheet | sing | Eisemann | hand |
| Lange.....B | 4,000 | 2,350 | 136* | solid | 36x4 | 38x6 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | thermo | cell-sheet | sing | Eisemann | hand |
| Larrabee | 3,000 | 1,950 | 132 | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | fin-cast | sing | Bosch | hand |
| Larrabee | 5,000 | 2,500 | 140* | solid | 36x4 | 36x6 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | fin-cast | sing | Bosch | hand |
| Lippard-Stewart.....M | 1,000 | 1,000 | 106 | pneu | 32x4 | 32x4 | under hood | 4 | 2 | 3 x5 | 14.40 | block | right | thermo | fin-sheet | sing | Atw. Kent | auto |
| Lippard-Stewart.....W | 1,500 | 1,600 | 125* | pneu* | 35x4½* | 33x4½* | under hood | 4 | 3 | 3½x5½ | 22.50 | block | left | cent | fin-sheet | sing | Eisemann | fixed |
| Lippard-Stewart.....H | 2,000 | 2,000 | 145 | solid | 36x3 | 36x3 | under hood | 4 | 3 | 3½x5 | 22.50 | block | left | cent | s-a-t-cast | sing | Eisemann | fixed |
| Lippard-Stewart.....F | 3,000 | 2,300 | 145 | solid | 36x3½ | 36x3d | under hood | 4 | 3 | 4½x5 | 27.20 | block | left | cent | s-a-t-cast | sing | Eisemann | fixed |
| Lippard-Stewart.....G | 4,000 | 2,600 | 158 | solid | 36x4 | 36x4d | under hood | 4 | 3 | 4½x5 | 27.20 | block | left | cent | s-a-t-cast | sing | Eisemann | fixed |

**ABBREVIATIONS: General,** **, with other options; opt, optional.* **Price,** *c, complete with body.* **Tires, Kind,** Pneu, *pneumatic;* Cush, *cushion;* p & s, *pneumatic in front and solid in rear;* s & st, *solid in front and steel in rear.* **Tire Sizes,** *d, dual.* **Motor Location,** btw seats, *between seats;* under flr, *under floor.* **Cylinders Cast,** sing, *single or individually.* **Location of Valves,** opp, *opposite or T-head type;* top (two-cylinder motors only), *L-head cylinder last horizontal with valves up;* r & h, *at right and in head, L-head cylinder;* l & h, *at left and in head, L-head cylinder;* 2-type, *two-type motor,* no valves. **Water Circulation** cent, *centrifugal pump;* gear, *gear pump;* thermo, *thermo-syphon circulation;* air, *air-cooled,* no water. **Radiator Type and Case,** fin-sheet, *finned-tube core with sheet metal casing;* fin-cast, *fin-tube core with cast aluminum casing;* sq-t-sheet, *square tube or flat tube core with sheet metal casing;* sq-t-cast, *square tube core with cast aluminum casing;* cell-sheet, *cellular or honeycomb core with sheet metal casing;* cell-cast, *cellular core with cast aluminum casing;* s a-t-sheet, *zig zag tube core with sheet metal casing;* s a-t-cast, *zig zag tube core with cast aluminum casing;* ring-cast, *copper tube core arranged in a ring about a central hub fan with a cast aluminum casing.* **Ignition, Type,** sing, *single;* dual, *double.* **Make of Magneto** (or other sparking device), Atw. Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* auto-h, *automatic advance with hand adjustment;* 2-pt, *two-point fixed, battery circuit fixed in retard, magneto in advance.*

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# Gasoline Commercial Vehicles in Tabulated Form

| Motor | | | | | | Transmission | | | | | | | | Springs | | Control | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Governor | | Speed | | | | Gearset | | | | | | | | | | | | |
| Type | Drive | Motor in r.p.m. | Truck in m.p.h. | Carburetor Make | Lubrication | Clutch Type | Type | Location | Speeds | Total Gear Reduction in High | Final Drive | Torque Taken By | Propulsion Taken By | Front | Rear | Steer | Levers | Name and Mode |
| cent | motor | 850 | 11 | G.V. | spl-press. | r-cone | selec | amid | 4 | 9 36 -1 | int-gear | tor-arm | rad-rd | l-ell. | l-ell. | right | right | G.V. Mercedes FV |
| cent | motor | 1,150 | 15 | Zenith | circ-spl | dry-d | prog | unit-m | 4 | ..... | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left* | cent | Hall |
| cent | motor | 1,150 | 15 | Zenith | circ-spl | dry-d | prog | unit-m | 4 | ..... | top worm | springs | springs | l-ell. | l-ell* | cent | Hall |
| cent | motor | 1,150 | 12 | Zenith | circ-spl | dry-d | prog | unit-m | 4 | ..... | dbl-chn | ..... | rad-rd. | l-ell. | l-ell* | cent | Hall |
| same | same | 1,600 | 25 | Stromberg* | circ-spl | cons | selec | unit-m | 3 | 6 20 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Hanger B |
| cent | duplex | 1,000 | 13 | Holley | spl-press | cone | selec | amid | 4 | 8 73 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Harvey WH |
| cent | duplex | 1,000 | 11 | Holley | spl-press | cons | selec | amid | 4 | 11 73 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Harvey WK |
| same | none | 2,000 | 32 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 6 25 -1 | top worm | springs | springs | l-ell. | l-ell. | left | | Henderson C |
| same | none | 2,000 | 25 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 8 25 -1 | top worm | springs | springs | l-ell. | l-ell. | left | | Henderson D |
| same | none | 1,600 | 12 | Schebler | circ-spl | wet-d | selec | unit-m | 3 | 4 80 -1 | dbl-chn-d. | sub-f | rad-rd. | l-ell. | l-ell. | left | cent | Headley |
| cent | motor | 1,200 | 16½ | Stromberg | spl-press. | dry-d | selec | amid | 3 | 7 79 -1 | top worm* | springs | rad-rd. | l-ell. | plat. | left | cent | Horner F-G |
| cent | motor | 1,200 | 13 | Stromberg | spl-press. | dry-d | selec | amid | 3 | 9 43 -1 | top worm* | springs | rad-rd. | l-ell. | plat. | left | cent | Horner F-G |
| cent | motor | 1,100 | 14 | Stromberg | spl-press. | dry-d | selec | amid | 3 | 9 40 -1 | top worm* | springs | rad-rd. | l-ell. | plat. | left | cent | Horner F-G |
| cent | motor | 1,000 | 9½ | Stromberg | spl-press. | dry-d | selec | amid | 3 | 13 47 -1 | dbl-chn. | ..... | rad-rd. | l-ell. | plat. | left | cent | Horner F |
| same | none | ..... | ..... | Zenith | spl-press. | ..... | selec | unit-m | 3 | ..... | ..... | ..... | ..... | ellip. | cant* | ..... | ..... | Hannibal A |
| same | none | ..... | ..... | Schebler | splash | cent-b | ind-c | amid | 2 | 9 10 -1 | dbl-chn | ..... | rad-rd. | ellip. | ellip. | right | right | I.H.C. MA |
| cent | motor | 1,300 | 18 | Holley | spl-press. | cent-b | ind-c | amid | 2 | 9 10 -1 | dbl-chn | ..... | rad-rd. | ellip. | ellip. | right | right | I.H.C. MW |
| cent | motor | 1,300 | 17½ | Holley | spl-press. | cent-b | ind-c | amid | 2 | 9 10 -1 | dbl-chn | ..... | rad-rd. | l-ell. | ellip. | right | right | I.H.C. E |
| cent | motor | 1,350 | 17 | Holley | spl-press. | cons | selec | amid | 3 | 8 00 -1 | int-gear | springs | springs | l-ell. | plat. | left | cent | I.H.C. F |
| cent | motor | 1,350 | 18 | Marvel | circ-spl | dry-d | selec | unit-m | 3 | 7 75 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Independent F |
| cent | motor | 1,200 | 15 | Marvel | circ-spl | dry-d | selec | unit-m | 3 | 8 66 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Independent G |
| cent | motor | 1,400 | 20 | Schebler | spl-press. | dry-p | selec | unit-m | 3 | 7 75 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Indiana S |
| cent | motor | 1,200 | 17 | Schebler | spl-press. | dry-p | selec | amid | 3 | 7 79 -1 | top worm | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Indiana D |
| cent | motor | 1,200 | 14½ | Schebler | spl-press. | dry-p | selec | amid | 3 | 8 70 -1 | top worm | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Indiana R |
| cent | motor | 1,200 | 15 | Schebler | spl-press. | dry-p | selec | amid | 3 | 11 75 -1 | top worm | ..... | rad-rd. | l-ell. | l-ell. | left | | Indiana L |
| cent | duplex | 1,112 | 14 | Stromberg | spl-press. | dry-p | ind-c | amid | 4 | 8 50 -1 | int-g-4 | springs | springs | l-ell. | l-ell. | left | cent | Jeffery 4015 |
| same | none | ..... | ..... | Holley | circ-spl | cone | selec | unit-m | 3 | 4 37 -1 | bevel | springs | springs | l-ell. | l-ell. | right | cent | Kearns L |
| same | none | 1,600 | 40 | Marvel | circ-spl | cone | selec | unit-m | 3 | 4 37 -1 | bevel | tor-4 | tor-4 | l-ell. | l-ell. | right | cent | Kearns D |
| lb. | motor | 1,200 | 15 | Rayfield | pressure | cone | selec | unit-j | 3 | 8 60 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Kelly-Springfield K-30 |
| lb. | motor | 1,200 | 14 | Rayfield | pressure | cone | selec | unit-j | 3 | 8 60 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Kelly-Springfield K-31 |
| lb. | motor | 1,200 | 11 | Rayfield | pressure | cone | selec | unit-j | 3 | 11 40 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Kelly-Springfield K-33 |
| lb. | motor | 900 | 9 | Rayfield | pressure | cone | selec | unit-j | 3 | 11 00 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Kelly-Springfield K-40 |
| lb. | motor | 900 | 8 | Rayfield | pressure | cone | selec | unit-j | 3 | 12 00 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Kelly-Springfield K-45 |
| lb. | motor | 900 | 8 | Rayfield | pressure | cone | selec | unit-j | 3 | 12 00 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Kelly-Springfield K-50 |
| lb. | motor | 900 | 8 | Rayfield | pressure | cons | selec | unit-j | 3 | 13 00 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Kelly-Springfield K-60 |
| cent | motor | 1,000 | 12 | Schebler | spl-press. | dry-d | ind-c | unit-j | 3 | 8 62 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | right | right | King |
| cent | motor | 1,160 | 22 | Stromberg | circ-spl | cone | selec | unit-m | 3 | 4 58 -1 | bevel | springs | springs | l-ell. | l-ell. | left | cent | Kisselkar |
| cent | motor | 1,120 | 17 | Stromberg | circ-spl | cone | selec | unit-m | 3 | 3 92 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Kisselkar |
| cent | motor | 1,275 | 15 | Stromberg | circ-spl | none | selec | amid | 4 | 7 86 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Kisselkar |
| cent | motor | 1,350 | 12 | Stromberg | circ-spl | cone | selec | unit-j | 4 | 9 90 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Kisselkar |
| cent | motor | 1,118 | 10 | Stromberg | circ-spl | cone | selec | unit-j | 4 | 11 10 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Kisselkar |
| cent | motor | 1,160 | 9 | Stromberg | circ-spl | cone | selec | unit-j | 4 | 12 70 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Kisselkar |
| cent | motor | 1,100 | 18 | Schebler | spl-press. | wet-d | selec | amid | 3 | 6 50 -1 | top worm | springs | springs | l-ell. | l-ell. | right | cent | Kleiber 1 |
| cent | motor | 1,150 | 18 | Schebler | spl-press. | wet-d | selec | amid | 3 | 8 00 -1 | top worm | springs | springs | l-ell. | l-ell. | right | cent | Kleiber 2 |
| cent | motor | 1,250 | 14 | Schebler | spl-press. | wet-d | selec | amid | 3 | 10 00 -1 | top worm | springs | springs | l-ell. | l-ell. | right | cent | Kleiber 3 |
| cent | motor | 1,050 | 14 | Schebler | spl-press. | wet-d | selec | amid | 4 | 8.75 -1 | top worm | springs | springs | l-ell. | l-ell. | right | cent | Kleiber 5 |
| cent | motor | 1,000 | 15 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 9 25 -1 | top worm | springs | rad-rd. | l-ell. | l-ell. | left | cent | Knickerbocker 16 |
| cent | motor | 1,000 | 12 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 10 33 -1 | top worm | springs | rad-rd. | l-ell. | l-ell. | left | cent | Knickerbocker 16 |
| same | none | 2,000 | 20 | Zenith | pressure | dry-p | selec | amid | 3 | 12 00 -1 | dbl-chn | ..... | rad-rd. | l-ell. | cant | left | cent | Knox Tractor 35 |
| same | none | 2,050 | 30 | opt | circ-spl | cone | selec | unit-m | 3 | 7 00 -1 | int-gear | springs | springs | l-ell. | l-ell. | left | cent | Koehler K |
| same | none | ..... | 30 | Holley* | spl-press. | dry-p | selec | unit-m | 3 | ..... | bevel | tor-4 | springs | l-ell. | l-ell.* | cent | | Kosmath 15 |
| cent | motor | 1,190 | 20 | Schebler | circ-spl | cone | selec | amid | 3 | 6 00 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Krebs F |
| cent | motor | 1,025 | 15 | Schebler | circ-spl | cone | selec | amid | 3 | 6.75 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Krebs G |
| cent | motor | 1,100 | 15 | Schebler | circ-spl | cone | selec | amid | 4 | 7 75 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Krebs H |
| cent | motor | 1,273 | 13 | Schebler | circ-spl | cone | selec | amid | 4 | 10 33 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Krebs I |
| ..... | ..... | 1,700 | 20 | Schebler | circ-spl | none | fric | inf | | ..... | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | | Lambert V1 |
| ..... | ..... | 1,500 | 15 | Schebler | circ-spl | none | fric | inf | | ..... | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | | Lambert V3 |
| ..... | ..... | 1,600 | 15 | Schebler | circ-spl | none | fric | inf | | ..... | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | | | Lambert V5 |
| ..... | ..... | 1,000 | 15 | Rayfield | circ-spl | dry-d | selec | unit-m | 3 | 7 00 -1 | int-gear | springs | springs | l-ell. | l-ell. | left | cent | Landshaft G1 |
| ..... | ..... | 900 | 12 | Rayfield | circ-spl | dry-d | selec | unit-m | 3 | 7 00 -1 | int-gear | springs | springs | l-ell. | l-ell. | left | cent | Landshaft J1 |
| cent | motor | 1,250 | 15 | Stromberg | circ-spl | wet-d | ind-c | | 3 | 8 00 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Lange C |
| cent | motor | 1,250 | 15 | Stromberg | circ-spl | wet-d | ind-c | amid | 3 | 9 71 -1 | dbl-chn | ..... | rad-rd. | l-ell. | l-ell. | left | cent | Lange B |
| cent | motor | 1,200 | 14 | Schebler | circ-spl | dry-d | selec | unit-m | 3 | 8 66 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Larrabee |
| cent | motor | 1,200 | 14 | Schebler | circ-spl | dry-d | selec | unit-m | 3 | 8 66 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Larrabee |
| same | none | 2,000 | 25 | Zenith | spl-press. | cone | selec | unit-m | 3 | 5 50 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Lippard-Stewart M |
| cent* | motor | 1,400* | 20* | Zenith | spl-press. | cone | selec | amid | 3 | 6 00 -1 | top worm* | springs | springs | l-ell. | l-ell. | left | cent | Lippard-Stewart W |
| cent | motor | 1,900 | 20 | Zenith | spl-press. | cone | selec | amid | 3 | 6 75 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Lippard-Stewart H |
| cent | motor | 1,600 | 18 | Zenith | spl-press. | cone | selec | amid | 3 | 7 75 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Lippard-Stewart F |
| cent | motor | 1,800 | 15 | Zenith | spl-press. | cone | selec | amid | 3 | 9 25 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent | Lippard-Stewart G |

**ABBREVIATIONS:** (continued). **Governor Type,** cent, centrifugal; l-b, lever-ball; suct, suction; hyd, hydraulic; elec, electric. **Governor Drive,** motor, from motor; d-shaft, from driving shaft; l-wheel, from front wheel; duplex, from both the motor and driving shaft by overrunning clutches. **Lubrication,** splash, non-circulating or simple splash; circ-spl, circulating splash; spl-press, splash pressure; fuel-inj, fuel injection; oil mixed with fuel; pressure, pressure feed, no splash. **Clutch Type,** dry-p, dry plate; dry-d, dry multiple disk; wet-d, wet disk or disk in oil; wet-p, wet plate or plate-in-oil; r-cone, reversed cone or inserted cone; cent-b, centrifugal band; exp-s, expanding shoe. **Gearset Type,** prog, progressive sliding gear; selec, selective sliding gear; plan, planetary; int-c, constant-mesh, internal-shaft; fric, friction; elec, electric. **Gearset Location,** amid, amidships; unit-m, unit with motor; unit-j, unit with jackshaft; unit-t, unit with axle. **Gearset Speeds,** inf, infinite number. **Final Drive,** int-g, int-gear, internal-gear; sing chn, single chain, dbl chn, double chain; double-rd, double reduction; spur-g, spur gears; up-bev, spiral bevel; f, front wheel or wheels; 4, four-wheel drives. **Torque Taken By,** rd-rd, radius rods; tor-arm, torque arm; tor-4, torsion rube; sub-f, sub-frame. **Propulsion Taken By,** rad-rd, radius rod; tor-t, to torsion tube; tor-arm, torque arm; sub-f, sub-frame. **Springs,** ellip, elliptic; l-ell, half elliptic; l-ell, quarter elliptic; l-ell, three-quarter elliptic; plat, platform; cant, cantilever. **Control Levers,** cent, center; c & r, parallelogram center, brake right; c & l, parallelogram center, brake left.

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# Specifications of Four Hundred Eight American

| Name and Model | | Capacity in Pounds | Price of Chassis | Wheelbase in Inches | Kind | TIRES Sizes in Inches Front | TIRES Sizes in Inches Rear | Location | No. of Cylinders | No. of Crankshaft Bearings | Bore and Stroke | MOTOR N.A.C.C. Hp. | MOTOR Cylinder Cast | MOTOR Valves Placed | MOTOR Cooling Water Circulation | MOTOR Cooling Radiator Core and Case | MOTOR Ignition Type | MOTOR Ignition Make | MOTOR Ignition Spark Advance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Little Giant | 15 | 1,500 | 1,500 | 120 | n & s | 34x4 | 34x3½ | under hood | 4 | 3 | 3½x | 19.61 | block | right | thermo | fin-sheet | dual | Eisemann | hand |
| Little Giant | 16 | 2,000 | 1,750 | 110 | solid | 37x5 | 37x5 | under fir | 4 | 3 | 3½x4 | 19.61 | block | right | thermo | fin-sheet | dual | Eisemann | hand |
| Little Giant | 16 | 4,000 | 2,500 | 144 | solid | 36x4 | 36x3½d | under hood | 4 | 3 | 4½x5 | 27.20 | block | right | thermo | fin-sheet | dual | Eisemann | hand |
| Lincoln | D | 1,500 | 900 | 122 | pneu | 33x5 | 33x5 | under hood | 4 | 3 | 3½x5 | 22.50 | block | head | thermo | fin-cast | sing | Bosch | fixed |
| Locomobile | B | 6,000 | 3,500 | 150 | solid | 36x5 | 36x5d | under hood | 4 | 5 | 4½x6 | 29.00 | pairs | opp | cent | cell-sheet | dual | Bosch | hand |
| Locomobile | BB | 8,000 | 3,650 | 150 | solid | 36x5 | 36x6d | under hood | 4 | 5 | 4½x6 | 29.00 | pairs | opp | cent | cell-sheet | dual | Bosch | hand |
| Lombard | | 10,000 | | | steel | 40x6 | creeper | under hood | 4 | | | | pairs | | cent | fin-sheet | dual | | hand |
| Marcar | K | 2,000 | 2,100 | 150* | solid | 36x4 | 36x5 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | cell-sheet | sing | | hand |
| Marcar | L | 2,000 | 2,100 | 150* | solid | 36x4 | 36x5 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | cell-sheet | sing | | hand |
| Marcar | J | 4,000 | 2,600 | 162* | solid | 36x4 | 36x4d | under hood | 4 | 3 | 4½x5½ | 32.49 | pairs | left | cent | cell-sheet | sing | opt | hand |
| Marcar | H | 4,000 | 2,600 | 162* | solid | 36x4 | 36x4d | under hood | 4 | 3 | 4½x5½ | 32.49 | pairs | left | cent | cell-sheet | sing | opt | hand |
| Marcar | O | 7,000 | 3,250 | 174* | solid | 36x5 | 36x5d | under hood | 4 | 3 | 4½x5½ | 32.49 | pairs | left | cent | cell-sheet | sing | opt | hand |
| Marcar | M | 7,000 | 3,250 | 174* | solid | 36x5 | 36x5d | under hood | 4 | 3 | 4½x5½ | 32.49 | pairs | left | cent | cell-sheet | sing | opt | hand |
| Mack | AB | 2,000 | 2,000 | 144* | solid* | 36x4* | 36x3½d* | under hood | 4 | 3 | 4 x5 | 25.60 | pairs | right | cent | cell-sheet | sing | Bosch | hand |
| Mack | AB | 3,000 | 2,350 | 144* | solid* | 36x4* | 36x3½d* | under hood | 4 | 3 | 4 x5 | 25.60 | pairs | right | cent | cell-sheet | sing | Bosch | fixed |
| Mack | AB | 4,000 | 2,700 | 144* | solid* | 36x4* | 36x4d* | under hood | 4 | 3 | 4 x5 | 25.60 | pairs | right | cent | cell-sheet | sing | Bosch | fixed |
| Mack | AC | 7,000 | 3,400 | 168* | solid | 36x5 | 40x5d | under hood | 4 | 3 | 5 x6 | 40.00 | pairs | right | cent | ring-cast | dual | Bosch | hand |
| Mack | AC | 11,000 | 4,000 | 168* | solid | 36x5 | 40x6d | under hood | 4 | 3 | 5 x6 | 40.00 | pairs | right | cent | ring-cast | dual | Bosch | hand |
| Mack | AC | 15,000 | 4,500 | 180 | solid | 37x7 | 41x7d | under hood | 4 | 3 | 5 x6 | 40.00 | pairs | right | cent | ring-cast | dual | Bosch | hand |
| Mack Tractor | AC | 30,000 | 4,000 | 116½ | solid | 36x5 | 40x6d | under hood | 4 | 3 | 5 x6 | 40.00 | pairs | right | cent | ring-cast | dual | Bosch | hand |
| Mais | C&D | 3,000 | 2,600 | 122* | solid | 36x4 | 36x5 | under hood | 4 | 3 | 4 x5½ | 25.60 | block | opp | cent | cell-sheet | sing | Eisemann | auto |
| Mais | E&F | 4,000 | 2,800 | 145* | solid | 36x5 | 36x7 | under hood | 4 | 3 | 4 x5½ | 25.60 | block | opp | cent | cell-sheet | sing | Eisemann | auto |
| Mais | K, L&H | 6,000 | 3,300 | 122* | solid | 36x5 | 36x5d | under hood | 4 | | 4½x5½ | 29.75 | block | opp | cent | cell-sheet | sing | Eisemann | auto |
| Mais | M | 8,000 | 3,750 | 145* | solid | 36x6 | 36x6d | under hood | 4 | | 4½x5½ | 29.75 | block | opp | cent | cell-sheet | sing | Eisemann | auto |
| Martin | R | 2,000 | 2,050 | 130 | solid | 36x3½ | 36x4 | under hood | 4 | 3 | 4 x5 | 25.60 | block | left | cent | fin-sheet | dual | Bosch | hand |
| Martin | S | 4,000 | 2,150 | 121 | solid | 36x3½ | 40x4 | under fir | 4 | 3 | 4 x5 | 25.60 | block | left | cent | fin-sheet | dual | Bosch | hand |
| Martin | S | 5,000 | 2,800 | 135 | solid | 36x4 | 40x3½d | under fir | 4 | 3 | 4½x5 | 29.00 | pairs | left | cent | fin-sheet | dual | Bosch | hand |
| Martin | L | 8,000 | 3,300 | 145 | solid | 36x5 | 40x4d | under fir | 4 | 3 | 4½x5½ | 36.15 | pairs | opp | cent | fin-sheet | dual | Bosch | hand |
| Mercedes | E | 1,500 | 1,125 | 124 | solid | 34x3½ | 34x3½ | under hood | 4 | 3 | 3½x5 | 22.50 | block | right | thermo | fin-sheet | sing | Bosch | hand |
| Mercedes | D | 2,500 | 1,575 | 130* | solid | 36x4 | 36x5 | under hood | 4 | 3 | 3½x5½ | 22.50 | block | left | cent | fin-sheet | sing | Bosch | hand |
| Mercedes | D | 4,000 | 2,240 | 144 | solid | 36x4 | 36x5* | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | fin-sheet | sing | Bosch | hand |
| Mercury | F | 1,000 | 650 | 85 | solid | 34x2 | 36x2 | under body | 2 | 2 | 4½x4 | 14.50 | sing | top | air | none | dual | Remy | 3-pt |
| Mercury-Bulley Tract A | | | 3,400 | 71 | 3-wheel | | | under hood | 4 | 5 | 4½x5 | 32.40 | pairs | opp | cent | cell-sheet | | | hand |
| Mercury-Bulley Tractor | | | 3,400 | 71 | solid | 34x4 | | under hood | 4 | 5 | 4½x5 | 32.40 | pairs | opp | cent | cell-sheet | | | hand |
| Modern | T | 2,000 | 1,327 | solid | 36x2 | 36x4 | under hand | 4 | 3 | 3½x5 | 19.61 | block | right | thermo | fin-cast | sing | Bosch | fixed |
| Modern | N | 3,000 | 1,447 | solid | 36x3½ | 36x5 | under hand | 4 | 3 | 3½x5 | 22.50 | block | left | cent | fin-cast | sing | Bosch | fixed |
| Modern | R | 4,000 | 1,597 | solid | 36x4 | 36x4d | under hand | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | fin-cast | sing | Bosch | fixed |
| Modern | B | 7,000 | 1,767 | solid | 38x5 | 38x5d | under hand | 4 | 3 | 4½x6½ | 36.15 | pairs | right | cent | fin-cast | sing | Eisemann | fixed |
| Moon | B | 3,000 | 1,650 | 140* | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 3½x5½ | 22.50 | block | l & h | cent | sq-t-sheet | dual | Bosch | hand |
| Moore | | 5,000 | 2,500 | 102½ | solid | 36x4 | 36x3½d | under hood | 4 | 3 | 4½x5½ | 32.40 | pairs | left | cent | cell-sheet | dual | Splitdorf | hand |
| Moore | | 10,000 | 4,500 | 175 | solid | 36x5 | 42x6 | under hood | 4 | 3 | 5½x7 | 44.20 | pairs | opp | cent | fin-sheet | dual | Splitdorf | hand |
| Moreland | | 2,000 | 1,550 | 126 | solid | 34x3½ | 34x4 | under hood | 4 | 3 | 3½x5 | 22.50 | block | left | thermo | cell-cast | sing | Bosch | hand |
| Moreland | | 2,000 | 1,850 | 126* | solid | 34x3½ | 34x5 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | right | cent | cell-cast | sing | Bosch | hand |
| Moreland | | 3,000 | 2,400 | 164* | solid | 34x4 | 34x4d | under hood | 4 | 3 | 4½x5½ | 32.49 | pairs | left | cent | cell-cast | sing | Bosch | hand |
| Moreland | | 5,000 | 3,200 | 168* | solid | 36x5 | 36x5d | under hood | 4 | 3 | 4½x6½ | 36.15 | pairs | left | cent | cell-cast | sing | Bosch | hand |
| Morton | | 6,000 | 112 | solid | 40x6 | 40x6 | h/w seats | | 3 | 3 | 4½x6½ | 36.15 | pairs | left | cent | cell-sheet | dual | Dixie | hand |
| Nelson & LeMoon | E3 | 2,000 | 1,700 | opt | solid | 36x3 | 36x4 | under hood | 4 | 3 | 3½x5½ | 22.50 | block | left | cent | sq-t-sheet | sing | Bosch | |
| Nelson & LeMoon | E2 | 4,000 | 2,250 | opt | solid | 36x4 | 36x7 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | sq-t-sheet | dual | Bosch | |
| Nelson & LeMoon | E3 | 6,000 | 2,950 | opt | solid | 36x5 | 38x5d | under hood | 4 | 3 | 4½x5½ | 32.40 | pairs | left | cent | sq-t-sheet | dual | Bosch | auto |
| Netco | C | 3,000 | 2,250 | 144* | solid | 36x3½ | 36x5 | under hood | 4 | 2 | 4½x5½ | 27.20 | block | left | cent | fin-cast | sing | Eisemann | fixed |
| Netco | D | 4,000 | 2,350 | 144* | solid | 36x4 | 36x6 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | left | cent | fin-cast | sing | Eisemann | fixed |
| New York | L | 3,000 | 1,800 | 129* | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 3½x5½ | 22.50 | block | left | cent | sq-t-sheet | sing | Bosch | fixed |
| Old Reliable | | 3,000 | 1,950 | 138* | solid | 34x3½ | 36x6 | under hood | 4 | 3 | 3½x5 | 22.50 | block | left | cent | fin-sheet | sing | Bosch | hand |
| Old Reliable | | 4,000 | 2,750 | 120* | solid | 34x4 | 36x4d | under fir | 4 | 3 | 4½x5 | 29.00 | pairs | opp | cent | fin-sheet | sing | Bosch | hand |
| Old Reliable | | 8,000 | 3,750 | 126* | solid | 36x5 | 36x5d | under fir | 4 | 3 | 4½x5½ | 36.15 | pairs | opp | cent | fin-sheet | sing | Bosch | hand |
| Old Reliable | | 10,000 | 4,250 | 126* | solid | 36x5 | 36x6d | under fir | 4 | 3 | 4½x5½ | 36.15 | pairs | opp | cent | fin-sheet | sing | Bosch | hand |
| Old Reliable | | 12,000 | 4,500 | 126* | solid | 36x6 | 40x7d | under fir | 4 | 3 | 4½x6½ | 36.15 | pairs | left | cent | fin-sheet | sing | Bosch | hand |
| Overland | 83 | 800 | 750-c | 106 | pneu | 33x4 | 33x4 | under hood | 4 | 5 | 4½x4½ | 27.20 | sing | left | thermo | cell-sheet | sing | Splitdorf | hand |
| Packard | 1D | 2,000 | 2,200 | 126* | solid | 34x3½ | 34x6 | under hood | 4 | 4 | 4 x5½ | 25.60 | block | right | cent | cell-sheet | dual | Dixie | hand |
| Packard | 1D | 2,000 | 2,500 | 126* | solid | 34x3½ | 34x3½d | under hood | 4 | 4 | 4 x5½ | 25.60 | block | right | cent | cell-sheet | dual | Dixie | hand |
| Packard | 2D | 4,000 | 2,800 | 144* | solid | 34x4 | 34x4 | under hood | 4 | 4 | 4 x5½ | 25.60 | block | right | cent | cell-sheet | dual | Dixie | hand |
| Packard | 3D | 6,000 | 3,400 | 156* | solid | 36x5 | 36x5d | under hood | 4 | 4 | 4½x5 | 32.40 | block | right | cent | cell-sheet | dual | Dixie | hand |
| Packard | 4D | 9,000 | 3,800 | 156* | solid | 36x5 | 40x5d | under hood | 4 | 4 | 4½x5½ | 32.40 | block | right | cent | cell-sheet | dual | Dixie | hand |
| Palmer | | 2,000 | 1,350 | 113½ | pneu* | 35x4½* | 35x4½* | under hood | 4 | 3 | 3½x5 | 22.50 | block | right | thermo | cell-cast | sing | Bosch | fixed |
| Palmer | | 4,000 | 1,675 | 144 | solid | 36x4 | 36x5 | under hood | 4 | 3 | 4½x5½ | 27.20 | block | l & h | cent | cell-cast | sing | Bosch | fixed |
| Palmer-Moore | K | 1,500 | 1,150 | 106 | solid* | 36x3* | 36x3½* | under hood | 4 | 3 | 3½x5½ | 19.61 | block | r & h | thermo | fin-cast | sing | Bosch | auto |
| Palmer-Moore | M | 2,000 | 1,350 | 126 | solid* | 36x3½* | 36x4* | under hood | 4 | 3 | 3½x5½ | 22.50 | block | r & h | thermo | fin-cast | sing | Bosch | auto |
| Paulding | DI | 1,500 | 975 | 120* | solid | 36x3 | 36x3 | under hood | 4 | 3 | 3½x5 | 16.92 | block | right | thermo | s-a-t-sheet | dual | Kingston | hand |
| Paulding | G-G1 | 2,000 | 1,300 | 120* | solid | 36x3½ | 36x4 | under hood | 4 | 3 | 4 x5 | 25.60 | block | right | thermo | s-a-t-sheet | dual | Kingston | hand |
| Paulding | E-E1 | 3,000 | 1,600 | 130* | solid | 36x4 | 36x5 | under hood | 4 | 3 | 4 x6 | 25.60 | block | right | thermo | s-a-t-sheet | dual | Kingston | hand |
| Paulding | H-H1 | 4,000 | 1,950 | 160* | solid | 36x4 | 36x4d | under hood | 4 | 3 | 4½x6 | 29.00 | block | right | thermo | s-a-t-sheet | dual | Kingston | hand |

**ABBREVIATIONS: General.** *, with other options; opt, optional. **Price,** -c, complete with body. **Tires, Kind,** Pneu, pneumatic; Cush, cushion; pneu, pneumatic in front and solid in rear; n & st, solid in front and steel in rear. **Tire Sizes,** d, dual. **Motor Location,** h/w seats, between seats; under fir, under floor. **Cylinders Cast,** sing, single or individually. **Location of Valves,** opp, opposite or T-slotted type, top (two-cylinder motors only), L-head cylinder laid horizontal with valve up; r & h, at right and in head, L-head cylinder; l & h, at left and in head, L-head cylinder; 2-eye, two-eyele Motor, no valves. **Water Circulation,** cent, centrifugal pump, gear, gear pump; thermo, thermo-syphon circulation; air, air-cooled, no water. **Radiator Type and Case,** fin-sheet, fin-cast, fin-sheet core with sheet metal casing, fin-cast, fin-cast core with cast aluminum casing; sq-t-sheet, square tube core with sheet metal casing; sq-t-cast, square tube core with cast aluminum casing; cell-sheet, cellular or honeycomb core with sheet metal casing; cell-cast, cellular core with cast aluminum casing; s-a-t-sheet, sq-t-sq tube core with sheet metal casing; s-a-t-cast, sq-t-sq tube core with cast aluminum casing; ring-cast, copper tube core arranged in a ring about a central tube for with a cast aluminum casing. **Ignition, Type,** sing, single; dual, double. **Make of Magneto** (or other spacing device), Alm, K-M, Mag, Bosch, Eisemann, Dixie, Kingston, Splitdorf. **Spark Advance,** auto, automatic; auto-h, automatic advance with hand adjustment; 2-pt, two-point fixed, battery current fixed in retard, magneto in advance.

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# Gasoline Commercial Vehicles in Tabulated Form

| Motor | | | | | | Transmission | | | | | | | Springs | | Control | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Governor | | Speed | | | | Gearset | | | | | | | | | | | |
| Type | Drive | Motor in r.p.m. | Truck in m.p.h. | Carburetor Make | Lubrication | Clutch Type | Type | Location | Speeds | Total Gear Reduction in High | Final Drive | Torque Taken By | Propulsion Taken By | Front | Rear | Steer | Levers | Name and Model |
| cent. | motor | 1,100 | 18½ | Schebler | spl-press. | dry-cl | selec | unit-m | 3 | 6.00 -1 | top worm | tor-st. | springs | 1-ell. | 1-ell. | right | cent | Little Giant ..... H |
| | | 1,200 | 15 | Schebler | spl-press. | wet-cl | selec | unit-j | 3 | 6.88 -1 | dbl-chn. | | rad-rd. | 1-ell. | 1-ell. | left | cent | Little Giant ..... H |
| cent. | motor | 1,100 | 15 | Schebler | spl-press. | dry-cl | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | 1-ell. | 1-ell. | right | cent | Little Giant ..... H |
| | | 1,500 | | Stromberg | circ-spl | cone | selec | unit-m | 3 | 6.00 -1 | bevel | | tor-arm. | springs | ellip. | left* | cent* | Lincoln ..... D |
| l-b | motor | 1,250 | 14½ | Locomobile | spl-press. | cone | selec | amid | 4 | 8.75*-1 | top worm | tor-arm. | rad-rd. | 1-ell. | 1-ell. | right | right | Locomobile ..... B |
| l-b | motor | 1,250 | 14½ | Locomobile | spl-press. | cone | selec | amid | 4 | 10.00 -1 | top worm | tor-arm. | rad-rd. | 1-ell. | 1-ell. | right | right | Locomobile ..... BB |
| cent. | motor | 1,400 | 6 | | press | wet-cl | | | 3 | | top worm | | | | | left | | Lombard |
| cent. | motor | 1,000 | 16 | Stromberg | spl-press. | dry-cl | selec | amid | 3 | 6.75 -1 | dbl-chn. | | rad-rd. | 1-ell. | plat. | left | cent | Macear ..... K |
| cent. | motor | 1,000 | 18 | Stromberg | spl-press. | dry-cl | selec | amid | 3 | 6.75 -1 | top worm | springs | springs | 1-ell. | 1-ell. | left | cent | Macear ..... L |
| cent. | motor | 1,000 | 13 | Stromberg | spl-press. | dry-cl | selec | unit-m | 3 | 8.50 -1 | dbl-chn. | | rad-rd. | 1-ell. | plat. | left | cent | Macear ..... J |
| cent. | motor | 1,000 | 13 | Stromberg | spl-press. | dry-cl | selec | unit-m | 3 | 8.50 -1 | top worm | springs | springs | 1-ell. | 1-ell. | left | cent | Macear ..... H |
| cent. | motor | 1,000 | 11 | Stromberg | spl-press. | dry-cl | selec | unit-m | 3 | 10.33 -1 | dbl-chn. | | rad-rd. | 1-ell. | plat. | left | cent | Macear ..... O |
| cent. | motor | 1,000 | 11 | Stromberg | spl-press. | dry-cl | selec | unit-m | 3 | 10.33 -1 | top worm | springs | springs | 1-ell. | 1-ell. | left | cent | Macear ..... M |
| cent. | motor | 1,160 | 14½ | Stromberg | spl-press. | dry-cl | selec | unit-m | 3 | 6.75 -1 | top worm | springs | springs | 1-ell. | 1-ell. | left* | cent | Mack ..... AB |
| cent. | motor | 1,160 | 16 | Stromberg | spl-press. | dry-cl | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | 1-ell. | 1-ell. | left* | cent | Mack ..... AB |
| cent. | motor | 1,160 | 16 | Stromberg | spl-press. | dry-cl | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | 1-ell. | 1-ell. | left* | cent | Mack ..... AB |
| cent. | motor | 1,000 | 15½ | Stromberg | spl-press. | dry-p | selec | unit-j | 3 | 7.84 -1 | dbl-chn. | | rad-rd. | 1-ell. | 1-ell. | left | cent | Mack ..... AC |
| cent. | motor | 1,000 | 11½ | Stromberg | spl-press. | dry-p | selec | unit-j | 3 | 10.50 -1 | dbl-chn. | | rad-rd. | 1-ell. | 1-ell. | left | cent | Mack ..... AC |
| cent. | motor | 1,000 | 8 | Stromberg | spl-press. | dry-p | selec | unit-j | 3 | 14.10 -1 | dbl-chn. | | rad-rd. | 1-ell. | 1-ell. | left | cent | Mack ..... AC |
| cent. | motor | 1,000 | 8 | Stromberg | spl-press. | dry-p | selec | unit-j | 3 | 14.10 -1 | dbl-chn. | | rad-rd. | 1-ell. | 1-ell. | left | cent | Mack Tractor ..... AC |
| l-b | gearset | 1,150 | 16 | Rayfield | circ-spl | exp-s. | prog | unit-m | 3 | | int-gear | tor-st. | rad-rd. | 1-ell. | 1-ell. | left | left | Maia ..... C&D |
| l-b | gearset | 1,150 | 16 | Rayfield | circ-spl | exp-s. | prog | unit-m | 3 | | int-gear | tor-st. | rad-rd. | 1-ell. | 1-ell. | left | left | Maia ..... E&F |
| l-b | gearset | 1,250 | 12 | Rayfield | circ-spl | exp-s. | prog | unit-m | 3 | | int-gear | tor-st. | rad-rd. | 1-ell. | 1-ell. | left | left | Maia ..... K, L&H |
| l-b | gearset | 1,250 | 12 | Rayfield | circ-spl | exp-s. | prog | unit-m | 3 | | int-gear | tor-st. | rad-rd. | 1-ell. | 1-ell. | left | left | Maia ..... M |
| | | 1,200 | 18 | Stromberg | pressure | wet-cl | selec | unit-m | 3 | 7.98 -1 | dbl-chn* | | rad-rd. | 1-ell. | 1-ell. | left | cent | Martin ..... R |
| | | 1,200 | 18 | Stromberg | pressure | wet-cl | selec | unit-j | 3 | 9.02 -1 | dbl-chn* | | rad-rd. | 1-ell. | 1-ell. | right | right | Martin ..... S |
| | | 1,200 | 13 | Stromberg | pressure | wet-cl | selec | unit-j | 3 | 10.40 -1 | dbl-chn* | | rad-rd. | 1-ell. | 1-ell. | left | cent | Martin ..... E |
| | | 1,000 | 12 | Stromberg | pressure | wet-cl | selec | unit-j | 3 | 10.41 -1 | dbl-chn* | | rad-rd. | 1-ell. | 1-ell. | right | right | Martin ..... L |
| cent. | d-shaft | 1,288 | 25 | Stromberg | circ-spl | dry-cl | selec | unit-m | 3 | 5.16 -1 | sp-bev | springs | rad-rd. | 1-ell. | 1-ell. | left | cent | Mononimos ..... E |
| cent. | d-shaft | 1,288 | 16 | Stromberg | circ-spl | dry-cl | selec | unit-m | 3 | 5.16 -1 | top worm | springs | rad-rd. | 1-ell. | 1-ell. | left | cent | Mononimos ..... F |
| cent. | d-shaft | 1,210 | 14 | Stromberg | circ-spl | dry-cl | selec | unit-m | 3 | 9.25 -1 | top worm | springs | rad-rd. | 1-ell. | 1-ell. | left | cent | Mononimos ..... D |
| none | none | | | Schebler | circ-spl | dry-cl | plan | unit-m | 2 | 9.00 -1 | dbl-chn | | rad-rd. | ellip. | ellip. | right | right | Mercury ..... P |
| none | motor | | 12 | | circ-spl | none | ind-c | unit-m | 3 | | dbl-chn | | rad-rd. | 1-ell. | 1-ell. | right | right | Mercury, Bulley Tract A |
| cent. | motor | | 12 | | circ-spl | cone | ind-c | unit-m | 3 | | dbl-chn | | rad-rd. | 1-ell. | 1-ell. | right | right | Mercury, Bulley Tractor |
| none | none | | | Zenith | spl-press. | dry-cl | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | 1-ell. | 1-ell. | right | cent | Modern ..... Y |
| none | none | | | Zenith | spl-press. | dry-cl | selec | unit-m | 3 | 7.75 -1 | top worm | springs | rad-rd. | 1-ell. | 1-ell. | right | | Modern ..... N |
| | | | | Zenith | spl-press. | dry-cl | selec | unit-m | 3 | 8.50 -1 | top worm | springs | rad-rd. | 1-ell. | 1-ell. | right | | Modern ..... R |
| | | | | Zenith | spl-press. | cone | selec | amid | 4 | 8.75 -1 | top worm | springs | rad-rd. | 1-ell. | 1-ell. | right | | Modern ..... B |
| none | none | | | Stromberg | circ-spl | cone | prog | unit-j | 3 | 5.62 -1 | bevel | | rad-rd. | 1-ell. | 1-ell. | left | cent | Moon ..... B |
| cent. | motor | 1,100 | 17 | Master | circ-spl | cone | selec | unit-j | 3 | 6.50 -1 | dbl-chn | | rad-rd. | 1-ell. | 1-ell. | left | cent | Moore |
| cent. | motor | 1,000 | 12 | Master | circ-spl | cone | selec | unit-j | 4 | 9.05 -1 | dbl-chn | | rad-rd. | 1-ell. | 1-ell. | right | right | Moore |
| none | none | 1,150 | 18 | Master* | circ-spl | dry-cl | selec | unit-m | 3 | 6.00 -1 | top worm | tor-arm. | springs | 1-ell. | 1-ell. | right | cent | Moreland |
| none | none | 1,120 | 15 | Master* | circ-spl | dry-cl | selec | unit-m | 3 | 6.75 -1 | top worm | springs | rad-rd. | 1-ell. | 1-ell. | right | cent | Moreland |
| cent. | motor | 1,050 | 14 | Master* | circ-spl | dry-p | selec | unit-m | 4 | 6.80 -1 | top worm | springs | rad-rd. | 1-ell. | 1-ell. | right | cent | Moreland |
| cent. | motor | 1,000 | 12 | Master* | circ-spl | dry-p | selec | amid | 4 | 7.80 -1 | top worm | springs | rad-rd. | 1-ell. | 1-ell. | right | cent | Moreland |
| cent. | motor | 1,250 | 25½ | Carter | pressure | wet-cl | selec | amid | 4 | 5.60 -1 | top worm-d | springs | springs | | | right | right | Morton |
| cent. | motor | 1,000 | 16 | Rayfield | circ-spl | dry-cl | selec | unit-m | 3 | 6.75 -1 | top worm | | | 1-ell. | 1-ell. | right | cent | Nelson & LeMoon ..E1 |
| cent. | motor | 1,000 | 14 | Rayfield | circ-spl | dry-cl | selec | unit-m | 3 | 8.75 -1 | top worm | | | 1-ell. | 1-ell. | right | cent | Nelson & LeMoon ..E2 |
| cent. | motor | 1,000 | 12 | Rayfield | circ-spl | dry-cl | selec | unit-m | 3* | 8.75 1* | top worm | | | 1-ell. | 1-ell. | right | cent | Nelson & LeMoon ..K3 |
| cent. | d-shaft | 1,200 | 15 | Zenith | circ-spl | dry-p | selec | unit-m | 3 | 7.50 -1 | top worm | springs | springs | 1-ell. | 1-ell. | left | cent | Nutco ..... C |
| cent. | d-shaft | 1,200 | 15 | Zenith | circ-spl | dry-p | selec | unit-m | 3 | 7.50 -1 | top worm | springs | springs | 1-ell. | 1-ell. | left | cent | Nutco ..... D |
| hyd | motor | | 18 | Stromberg | spl-press. | cone | selec | amid | 3 | | top worm* | | rad-rd. | 1-ell. | 1-ell. | right | right | New York ..... L |
| none | none | | 16 | Stromberg | spl-press. | dry-cl | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | 1-ell. | 1-ell. | right | cent | Old Reliable |
| none | none | | 16 | Stromberg | press. | wet-cl | selec | unit-j | 3 | 8.23 -1 | dbl-chn | | rad-rd. | 1-ell. | 1-ell. | right | right | Old Reliable |
| none | none | | 14 | Stromberg | spl-press. | wet-cl | selec | unit-j | 3 | 8.14 -1 | dbl-chn | | rad-rd. | 1-ell. | 1-ell. | right | right | Old Reliable |
| none | none | | 12 | Stromberg | spl-press. | wet-cl | selec | unit-j | 3 | 8.82 -1 | dbl-chn | | rad-rd. | 1-ell. | 1-ell. | right | right | Old Reliable |
| l-b | motor | 750 | 10 | Stromberg | circ-spl | wet-cl | selec | unit-j | 3 | 9.83 -1 | dbl-chn | | rad-rd. | 1-ell. | 1-ell. | right | right | Old Reliable |
| none | none | | 45 | Stromberg | circ-spl | cone | selec | unit-i | 3 | 3.60 -1 | bevel | tor-t | tor-t | 1-ell. | 1-ell. | left | cent | Overland ..... S3 |
| cent. | motor | 1,000 | 16 | Packard | pressure | dry-cl | prog | amid | 2 | 6.25 -1 | top worm | tor-arm | rad-rd. | 1-ell. | 1-ell. | left | left | Packard ..... 1D |
| cent. | motor | 1,000 | 16 | Packard | pressure | dry-cl | prog | amid | 3 | 6.25 -1 | top worm | tor-arm | tor-arm | rad-rd. | 1-ell. | left | left | Packard ..... 1D |
| cent. | motor | 1,000 | 14 | Packard | pressure | dry-cl | prog | amid | 2 | 7.26 -1 | top worm | tor-arm | tor-arm | rad-rd. | 1-ell. | left | left | Packard ..... 2D |
| cent. | motor | 1,000 | 12 | Packard | pressure | dry-cl | prog | amid | 3 | 9.00 -1 | top worm | tor-arm | tor-arm | rad-rd. | 1-ell. | left | left | Packard ..... 3D |
| cent. | motor | 1,000 | 12 | Packard | pressure | dry-cl | prog | amid | 3 | 10.00 -1 | top worm | tor-arm | rad-rd. | 1-ell. | 1-ell. | left | left | Packard ..... 4D |
| none | none | | | Stromberg | circ-spl | dry-cl | selec | unit-m | 3 | | int-gear | springs | springs | 1-ell. | 1-ell. | left | cent | Palmer |
| cent. | motor | | 15 | Stromberg | circ-spl | dry-cl | selec | unit-m | 3 | | top worm | springs | rad-rd. | 1-ell. | 1-ell. | left | cent | Palmer |
| cent. | motor | 1,275 | 20 | Zenith | circ-spl | dry-cl | selec | amid | 3 | 6.83 -1 | int-gear | tor-arm | springs | 1-ell. | 1-ell. | left | | Palmer-Moore ..... K |
| cent. | duplex | 1,150 | 18 | Zenith | circ-spl | dry-cl | selec | amid | 3 | 6.83 -1 | int-gear | tor-arm | springs | 1-ell. | plat. | left | | Palmer-Moore ..... M |
| none | none | 1,000 | 18 | Kingston | spl-press. | dry-cl | selec | unit-m | 3 | 6.00 -1 | int-gear | springs | springs | 1-ell. | plat. | left* | cent | Paulding ..... D1 |
| none | none | 1,000 | 18 | Kingston | spl-press. | dry-cl | selec | unit-m | 3 | 6.00 -1 | int-gear* | springs | springs* | 1-ell. | plat. | left* | cent | Paulding ..... G-G1 |
| none | none | 1,000 | 15 | Kingston | spl-press. | dry-cl | selec | unit-m | 3 | 7.00 -1 | int-gear* | springs | springs* | 1-ell. | 1-ell. | left* | cent | Paulding ..... E-E1 |
| none | none | 1,000 | 11½ | Kingston | spl-press. | dry-cl | selec | unit-m | 3 | 8.00 -1 | int-gear* | springs | springs* | 1-ell. | 1-ell. | left* | cent | Paulding ..... H-H1 |

**ABBREVIATIONS:** (continued). **Governor Type**, cent, centrifugal; l-b, loose-ball; mot, motion; hyd, hydraulic; elec, electric. **Governor Drive**, motor, from motor; d-shaft, from driving shaft; f-wheel, from front wheel; duplex, from both the motor and driving shaft by overrunning clutches. **Lubrication**, splash, non-circulating or simple splash; circ-spl, circulating splash; spl-press, splash-pressure; fpd-inj, fuel injection, oil mixed with fuel; pressure, pressure feed, no splash. **Clutch Type**, dry-p, dry plate; dry-cl, dry multiple disk; wet-cl, wet disk or disk-in-oil; wet-p, wet plate or disk-in-oil; cone, cone; expanding or overrid cone; cont-b, contracting band; exp-s, expanding shoe. **Gearset Type**, prog, progressive sliding gear; selec, selective sliding gear; plan, planetary; ind-c, constant-mesh, individual-clutch; frc, friction; elec, electric. **Gearset Location**, amid, amidships; unit-m, unit with motor; unit-j, unit with jackshaft; unit-i, unit with axle. **Gearset Speeds**, inf, infinite number. **Final Drive**, int-g, int-gear, internal-gear; sing chn, single chain; dbl chn, double chain; doub-red, double reduction; spur-g, spur gears; sp-bev, spiral bevel; f, front wheel or wheels; 4, four-wheel driven. **Torque Taken By**, rad-rd, radius rods; tor-arm, torque arm; tor-t, torsion tube; mtbd, mid-tube. **Propulsion Taken By**, rad-rd, radius rod; tor-t, torsion tube; tor-arm, torque arm; mtbd, mid-tube. **Springs**, ellip, elliptic; 1-ell, half elliptic; 1-ell, quarter elliptic; 3-ell, three-quarter elliptic; plat, platform; cant, cantilever. **Control**, **Levers**, cent, center; c & t, gearshift center, brake right; c & l, gearshift center, brake left.

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# Specifications of Four Hundred Eight American

| Name and Model | Capacity in Pounds | Price of Chassis | Wheelbase in Inches | TIRES Kind | TIRES SIZES IN INCHES Front | TIRES SIZES IN INCHES Rear | Location | No. of Cylinders | No. of Crankshaft Bearings | Bore and Stroke | MOTOR N.A.C.C. Hp. | MOTOR Cylinders Cast | MOTOR Valves Placed | MOTOR COOLING Water Circulation | MOTOR COOLING Radiator Core and Case | MOTOR IGNITION Type | MOTOR IGNITION Make | MOTOR IGNITION Spark Advance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Peerless.....TC2 | 4,000 | ..... | 145 | solid | 36x4 | 36x4 | under hood | 4 | 3 | 4½×6 | 32.40 | pairs | opp | gear | fin-sheet | dual | Remy | hand |
| Peerless.....TC3 | 6,000 | ..... | 151* | solid | 36x4 | 40x4 | under hood | 4 | 3 | 4½×6 | 32.40 | pairs | opp | gear | fin-sheet | dual | Remy | hand |
| Peerless.....TC4 | 8,000 | ..... | 151* | solid | 36x5 | 40x5 | under hood | 4 | 3 | 4½×6 | 32.40 | pairs | opp | gear | fin-sheet | dual | Remy | hand |
| Peerless.....TC5 | 10,000 | ..... | 151* | solid | 36x6 | 42x6 | under hood | 4 | 3 | 4½×6 | 32.40 | pairs | opp | gear | fin-sheet | dual | Remy | hand |
| Peerless.....TC6 | 12,000 | ..... | 151* | solid | 36x7 | 42x7 | under hood | 4 | 3 | 4½×6 | 32.40 | pairs | opp | gear | fin-sheet | dual | Remy | hand |
| Pierce-Arrow | 4,000 | 3,000 | 150* | solid | 36x4 | 36x4 | under hood | 4 | ..... | 4 x 5½ | 25.60 | pairs | opp | cent | fin-cast | dual | Bosch | hand |
| Pierce-Arrow | 10,000 | 4,500 | 168* | solid | 36x5 | 40x5 | under hood | 4 | ..... | 4½×6 | 38.25 | pairs | opp | cent | fin-cast | dual | Bosch | hand |
| Reo.....F | 1,500 | 1,000 | 120 | pneu | 34x4½ | 34x4½ | under hood | 4 | 3 | 4¼×4½ | 27.20 | pairs | r & h | cent | fin-sheet | sing | Remy | hand |
| Reo.....J | 4,000 | 1,650 | 136 | solid | 36x4 | 36x4½ | under hood | 4 | 3 | 4¼×4½ | 27.20 | pairs | r & h | cent | fin-sheet | dual | National | hand |
| Republic.....F | 1,500 | 995* | 154 | solid* | 34x3* | 34x3½* | under hood | 4 | 3 | 3½×5 | 19.61 | block | right | thermo | fin-sheet | sing | Bosch | fixed |
| Republic.....E | 2,000 | 1,275 | 144 | solid* | 34x3* | 34x4* | under hood | 4 | 3 | 3½×5 | 22.50 | block | right | thermo | fin-sheet | sing | Bosch | fixed |
| Republic.....A | 4,000 | 1,475 | 144 | solid | 34x4 | 34x6* | under hood | 4 | 3 | 4½×5 | 27.20 | block | right | cent | fin-sheet | sing | Bosch | fixed |
| Republic.....T | 6,000 | 2,000 | 156 | solid | 36x4 | 40x5 | under hood | 4 | 3 | 4½×5 | 32.00 | block | right | cent | fin-sheet | sing | Bosch | hand |
| Rowe.....CW | 2,000 | 2,650 | 150 | solid | 34x3½ | 34x4 | under hood | 4 | 3 | 3½×5 | 16.92 | block | left | cent | sq-t-sheet | sing | Bosch | hand |
| Rowe.....CDW | 4,000 | 2,890 | 144 | solid | 34x4 | 34x3½ | ..... | 4 | 3 | 4 x 5 | 25.60 | block | left | cent | sq-t-sheet | sing | Bosch | ..... |
| Rowe.....CW | 6,000 | 3,400 | 156 | solid | 36x5 | 36x5 | ..... | 4 | 3 | 4½×5 | 29.00 | pairs | opp | cent | sq-t-sheet | sing | Bosch | ..... |
| Rowe.....TW | 10,000 | 4,900 | 156 | solid | 36x6 | 40x6 | under hood | 4 | 3 | 4½×5 | 34.15 | pairs | opp | cent | sq-t-sheet | dual | Bosch | hand |
| Royal.....A | 7,000 | 3,500 | 148 | solid | 36x5 | 38x5 | under hood | 4 | 3 | 4½×5 | 29.00 | pairs | opp | cent | fin-cast | dual | Bosch | fixed |
| Royal.....A | 10,000 | 4,500 | 138* | solid | 36x6 | 40x6 | under hood * | 4 | 3 | 4¾×5 | 36.15 | pairs | opp | cent | fin-cast | dual | Bosch | fixed |
| Royal.....A | 12,000 | 4,800 | 160 | solid | 36x6 | 40x6 | under seats | 4 | 3 | 5¼×5 | 41.61 | pairs | opp | cent | fin-cast | dual | Bosch | fixed |
| R-S | 350 | 305 | 66 | pneu | 28x3 | 28x3 | amid | 2 | 2 | 3½×3½ | 9.12 | sing | back | air | none | sing | Bosch | hand |
| Salvador | 4,000 | 2,000 | 124* | cush | 36x4½ | 36x6 | btw seats | 4 | 3 | 4 x 4½ | 25.60 | pairs | left | cent | cell-cast | sing | Eisemann | auto. |
| Sandow | 3,000 | 1,800 | 150* | solid | 36x3 | 36x4 | under hood | 4 | 3 | 3½×5½ | 22.50 | block | left | cent | cell-sheet | sing | Bosch | hand |
| Sandow | 4,000 | 2,350 | 170* | solid | 36x4 | 36x4½ | under hood | 4 | 3 | 4½×5 | 27.20 | block | left | cent | cell-sheet | sing | Bosch | hand |
| Sandow | 4,000 | 2,600 | 171* | solid | 36x4 | 36x4½ | under hood | 4 | 3 | 4½×5 | 27.20 | block | left | cent | cell-sheet | sing | Bosch | hand |
| Sandow | 6,000 | 3,000 | 188* | solid | 36x5 | 36x5½ | under hood | 4 | 3 | 4½×5½ | 32.40 | block | left | cent | cell-sheet | sing | Bosch | hand |
| Sandow | 6,000 | 3,250 | 166 | solid | 36x5 | 36x5½ | under hood | 4 | 3 | 4½×5½ | 32.40 | block | left | cent | sq-t-sheet | sing | Bosch | hand |
| Sanford.....O | 1,500 | 1,290 | 120 | pneu* | 34x4½* | 35x5* | ..... | 4 | 3 | 3½×5 | 19.61 | block | right | cent | fin-cast | sing | Splitdorf | fixed |
| Sanford.....P | 2,000 | 1,350 | 130 | pneu* | 34x4½* | 35x5* | ..... | 4 | 3 | 3½×5 | 19.61 | block | right | cent | fin-cast | sing | Splitdorf | fixed |
| Sanford.....M | 4,000 | 1,910 | 140 | solid | 36x4 | 36x6 | under hood | 4 | 3 | 4 x 4½ | 25.60 | pairs | right | cent | fin-cast | sing | Splitdorf | 2-pt. |
| Sauer | 10,000 | 4,600 | 153 | solid | 36x5 | 42x5 | under hood | 4 | 3 | 4½×5 | 30.65 | pairs | opp | cent | cell-sheet | sing | Bosch | hand |
| Sauer | 12,000 | 4,850 | 156 | solid | 36x6 | 42x6 | under hood | 4 | 3 | 4½×5 | 30.65 | pairs | opp | cent | cell-sheet | sing | Bosch | hand |
| Saxon | 400 | 395 | 96 | pneu | 28x3 | 28x3 | under hood | 4 | 2 | 2½×4 | 12.06 | block | left | thermo | cell-sheet | sing | Atw. Kent | auto |
| Selden.....T | 3,000 | 1,700 | 126* | solid | 34x3 | 34x3½ | under hood | 4 | 3 | 3½×5 | 19.61 | block | left | thermo | sq-t-sheet | sing | Bosch | fixed |
| Selden.....JC | 4,000 | 2,000 | 150 | solid | 36x4 | 36x4½ | under hood | 4 | 3 | 3½×5 | 22.50 | block | right | cent | sq-t-sheet | sing | Bosch | fixed |
| Selden.....JWL | 4,000 | 2,750 | 150* | solid | 36x4 | 36x4½* | under hood | 4 | 3 | 4½×5 | 27.20 | block | right | cent | sq-t-sheet | sing | Bosch | fixed |
| Selden.....N | 6,000 | 3,150 | 160 | solid | 36x5 | 36x5 | under hood | 4 | 3 | 4½×5 | 32.40 | pairs | right | cent | sq-t-sheet | sing | Eisemann | fixed |
| Service.....12B | 2,000 | 1,375 | 135 | solid | 34x3 | 34x4 | under hood | 4 | 3 | 3½×5½ | 19.61 | block | right | thermo | fin-sheet | sing | Bosch | hand |
| Service.....QW | 3,000 | 2,100 | 150 | solid | 36x3½ | 36x5 | under hood | 4 | 3 | 4½×5 | 27.20 | block | left | cent | fin-sheet | sing | Eisemann | hand |
| Service.....FW | 4,000 | 2,500 | 160* | solid | 36x4 | 36x6 | under hood | 4 | 3 | 4½×5 | 27.20 | block | right | cent | fin-sheet | sing | Eisemann | hand |
| Service.....HW | 7,000 | 3,500 | 171* | solid | 36x5 | 40x6 | under hood | 4 | 3 | 4½×5 | 32.40 | block | left | cent | cell-sheet | dual | Eisemann | hand |
| Service.....HX | 10,000 | 4,000 | 171* | solid | 36x6 | 40x6 | under hood | 4 | 3 | 4½×6 | 36.15 | pairs | left | cent | cell-sheet | dual | Eisemann | hand |
| Signal.....F | 2,000 | 1,550 | 144* | solid | 34x3 | 36x4 | under hood | 4 | 3 | 3½×5 | 22.50 | block | left | cent | fin-cast | sing | Eisemann | fixed |
| Signal.....H | 3,000 | 1,850 | 144* | solid | 34x3½ | 36x4 | under hood | 4 | 3 | 3½×5 | 22.50 | block | left | cent | fin-sheet | sing | Eisemann | fixed |
| Signal.....J | 4,000 | 2,100 | 150 | solid | 34x4 | 36x4 | under hood | 4 | 3 | 4½×5 | 27.20 | block | left | cent | fin-cast | sing | Eisemann | fixed |
| Signal.....M | 7,000 | 3,000 | 168* | solid | 40x5 | 40x5 | under hood | 4 | 3 | 4½×5 | 32.40 | pairs | left | cent | fin-cast | sing | Eisemann | fixed |
| South Bend.....38 | 1,500 | 1,475 | 120* | pneu | 34x4½ | 34x4½ | under hood | 4 | 3 | 3½×5 | 22.50 | block | left | thermo | cell-sheet | dual | Bosch | hand |
| South Bend.....40 | 3,000 | 1,750 | 136 | solid | 36x4 | 36x4½ | under hood | 4 | 3 | 4 x 5 | 25.60 | block | left | cent | cell-sheet | dual | Bosch | hand |
| South Bend.....40-2 | 4,000 | 2,000 | 142 | solid | 36x4 | 36x3½ | under hood | 4 | 3 | 4 x 5 | 25.60 | block | left | cent | cell-sheet | dual | Bosch | hand |
| South Bend.....60 | 7,000 | 3,250 | 160* | solid | 36x6 | 36x5 | under hood | 4 | 3 | 4½×5½ | 36.15 | pairs | opp | cent | cell-sheet | dual | Bosch | hand |
| Standard.....2B | 4,000 | 2,000 | 140 | solid | 36x4 | 36x6 | under hood | 4 | 3 | 4½×5 | 27.20 | block | left | cent | fin-sheet | sing | Eisemann | auto. |
| Standard.....4B | 7,000 | 2,500 | 144* | solid | 36x5 | 36x5 | under hood | 4 | 3 | 4½×5 | 32.40 | pairs | left | cent | fin-sheet | sing | Eisemann | auto. |
| Standard.....4B | 9,000 | 3,075 | 144* | solid | 36x5 | 36x5 | under hood | 4 | 3 | 4½×5 | 32.40 | pairs | left | cent | fin-sheet | sing | Eisemann | auto. |
| Standard.....5B | 10,000 | 3,400 | 144* | solid | 36x6 | 36x6 | under hood | 4 | 3 | 4½×5 | 36.00 | pairs | left | cent | fin-sheet | sing | Eisemann | auto. |
| Standard Tractor.....B | 12,000 | 3,500 | 72 | solid | 36x5 | 38x5d | btw seats | 4 | 3 | 4½×5 | 36.15 | pairs | left | cent | sq-t-sheet | dual | Bosch | hand |
| Standard Tractor.....D | 20,000 | 4,000 | 78 | solid | 36x6 | 40x6d | btw seats | 4 | 3 | 5¼×6 | 46.15 | pairs | left | cent | sq-t-sheet | dual | Bosch | hand |
| Stearns | 10,000 | 3,800 | 144* | solid | 34x5 | 38x5d | under hood | 4 | 5 | 4½×5½ | 29.00 | pairs | sleeve | cent | cell-sheet | dual | Bosch | hand |
| Stegeman | 3,000 | 1,900 | 150 | solid | 34x3½ | 36x5 | under hood | 4 | 3 | 4½×5½ | 27.20 | block | ..... | cent | sq-t-sheet | sing | Eisemann | auto. |
| Stegeman | 3,000 | 2,000 | 144* | solid | 34x3 | 36x4d | under hood | 4 | 3 | 4½×5½ | 27.20 | block | left | cent | sq-t-sheet | sing | Eisemann | auto. |
| Stegeman.....Special | 3,000 | 2,200 | 142* | solid | 40x4 | 40x6 | under hood | 6 | 4 | 4½×5½ | 27.20 | block | left | cent | sq-t-sheet | sing | Eisemann | auto. |
| Stegeman | 7,000 | ..... | 160 | solid | 40x5 | 40x6d | under hood | 6 | 4 | 5½×5½ | 33.75 | block | left | cent | fin-cast | sing | Eisemann | auto. |
| Sterling | 1,500 | 895 | 127 | pneu | 34x4 | 34x4 | under hood | 4 | 2 | 3½×4½ | 15.64 | block | right | thermo | fin-cast | sing | Bosch | hand |
| Sterling | 4,000 | 2,800 | 148* | solid | 36x4 | 36x6d | under hood | 4 | 3 | 4 x 5½ | 25.60 | pairs | right | cent | fin-cast | sing | Eisemann | auto. |
| Sterling | 7,000 | 3,400 | 158* | solid | 36x4 | 36x5d | under hood | 4 | 3 | 4½×5 | 29.00 | pairs | right | cent | fin-cast | sing | Eisemann | auto. |
| Sterling | 10,000 | 4,500 | 178 | solid | 36x6 | 40x6d | under hood | 4 | 3 | 4¾×5 | 32.40 | pairs | right | cent | fin-cast | dual | Eisemann | auto. |
| Sterling | 14,000 | 4,750 | 178 | solid | 36x6 | 40x7d | under hood | 4 | 3 | 5×5½ | 36.15 | pairs | right | cent | fin-cast | dual | Eisemann | auto. |
| Stewart (B).....3 | 1,500 | ..... | 118* | pneu | 34x4½ | 34x4½ | under hood | 4 | 3 | 3½×5 | 19.61 | block | right | thermo | cell-sheet | sing | Bosch | fixed |
| Stewart (B).....4 | 2,500 | ..... | 128 | solid | 35x3½ | 35x4 | under hood | 4 | 3 | 3½×5 | 19.61 | block | right | thermo | cell-sheet | sing | Bosch | fixed |
| Stewart (C).....A | 2,000 | 700 | 96 | pneu | 30x3 | 30x3 | under fr | 2 | 2 | 5 x 5½ | 20.00 | sing | ..... | cent | cell-sheet | dual | Kingston | hand |
| Studebaker.....SF | 1,000 | 785 | 112 | pneu | 34x4 | 34x4 | under hood | 4 | 3 | 3½×5 | 24.22 | block | left | cent | fin-sheet | sing | battery | hand |
| Studebaker.....J | 2,000 | ..... | 135 | pneu | 36x4 | 36x5 | under hood | 4 | 3 | 3½×5 | 24.22 | block | left | cent | fin-sheet | sing | battery | hand |

**ABBREVIATIONS. General**, *, with other options; opt, optional. **Price**, -c, complete with body. **Tires**, Kind, Pneu, pneumatic; Cush, cushion; pneumatic in front and solid in rear; s & st, solid in front and steel in rear. **Tire Sizes**, d, dual. **Motor Location**, btw seats, between seats; under fr, under four. **Cylinders Cast**, sing, singly or individually. **Location of Valves**, opp, opposite or T-head type; tup (two cylinder motors only), L-head cylinder laid horizontal with valves up; r & h, at right and in head, L-head cylinder; l & h, at left and in head, L-head cylinder; 3-eye, two opposite motor, no valve. **Water Circulation**, cent, central; pump; gear, gear pump; thermo, thermo-siphon circulation; air, air-cooled, no water. **Radiator Type and Core**, fin-sheet, finned-tube core with sheet metal casing; fin-cast, fin-tube core with cast aluminum casing; sq-t-sheet, square tube or flat tube core with sheet metal casing; sq-t-cast, square tube core with cast aluminum casing; cell-sheet, cellular or honeycomb core with sheet metal casing; cell-cast, cellular core with cast aluminum casing; s-t-sheet, zig-zag tube core with sheet metal casing; s-t-cast, zig-zag tube core with cast aluminum casing; ring-cast, copper tube core arranged in a ring about a central space for a cast aluminum casing. **Ignition**, Type, sing, single; doub, double. **Make of Magneto** (or other sparking device), Atw, Kent, Atwater Kent. **Spark Advance**, auto, automatic; auto-h, automatic advance with hand adjustment; 2-pt, two-point fixed, battery circuit fixed to retard, magneto to advance.

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# Gasoline Commercial Vehicles in Tabulated Form

| Motor | | | | | | Transmission | | | | | | | | Springs | | Control | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Governor | | Speed | | Carburetor Make | Lubrication | Clutch Type | Gearset | | | Total Gear Reduction in High | Final Drive | Torque Taken By | Propulsion Taken By | Front | Rear | Steer | Levers | Name and Model |
| Type | Drive | Motor in r.p.m. | Truck in m.p.h. | | | | Type | Location | Speeds | | | | | | | | | |
| cent. | motor | 925 | 14½ | Stromberg | splash | cone | selec | amid | 3 | 6.00 -1 | top worm | springs | springs | l-ell. | l-ell. | right | right | Peerless TC2 |
| cent. | motor | | | Stromberg | splash | cone | selec | unit-[illegible] | 4 | 7.45 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | right | right | Peerless TC3 |
| cent. | motor | | | Stromberg | splash | cone | selec | unit-[illegible] | 4 | 6.70 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | right | right | Peerless TC4 |
| cent. | motor | | | Stromberg | splash | cone | selec | unit-[illegible] | 4 | 10.50 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | right | right | Peerless TC5 |
| cent. | motor | | | Stromberg | splash | cone | selec | unit-[illegible] | 4 | 10.50 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | right | right | Peerless TC6 |
| cent. | motor | 1,050 | 16 | Pierce-A. | pressure | cone | selec | unit-m | 3 | 7.00 -1 | top worm | tor-arm | rad-rd. | l-ell. | l-ell. | right | right | Pierce-Arrow |
| cent. | motor | 900 | 14 | Pierce-A. | pressure | cone | selec | amid | 3 | 7.82 -1 | top worm | tor-arm | rad-rd. | l-ell. | l-ell. | right | right | Pierce-Arrow |
| none | none | | 22 | Johnson | eire-spl | dry-d | selec | amid | 3 | 4.00 -1 | bevel | tor-arm | springs | l-ell. | l-ell. | left | cent. | Roe F |
| hyd | motor | 1,200 | 15 | Johnson | eire-spl | dry-d | selec | amid | 3 | 6.70 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | left | cent. | Roe J |
| cent. | motor | 1,200 | 18 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 7.00 -1 | int-gear | springs | springs | l-ell. | l-ell. | left | cent. | Republic F |
| cent. | motor | 1,600 | 18 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 7.00 -1 | int-gear | springs | springs | l-ell. | l-ell. | left | cent. | Republic E |
| cent. | motor | 1,100 | 18 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 8.40 -1 | int-gear | springs | springs | l-ell. | l-ell. | left | cent. | Republic A |
| cent. | motor | 1,100 | 11 | Stromberg | spl-press. | dry-d | selec | amid | 3 | 11.00 -1 | int-gear | springs | springs | l-ell. | l-ell. | left | cent. | Republic T |
| cent. | motor | 1,200 | | | dry-d | selec | unit-m | 4 | | | top worm | springs | springs | l-ell. | l-ell. | left | cent. | Rauch CW |
| cent. | motor | 1,100 | | Rayfield | pressure | dry-d | selec | unit-m | 4 | | top worm | springs | springs | l-ell. | l-ell. | left | c & l. | Rowe CDW |
| cent. | motor | 1,000 | | Rayfield | pressure | | selec | amid | 4 | | top worm | springs | rad-rd. | l-ell. | l-ell. | left | cent. | Rowe DFW |
| cent. | motor | | | | pressure | wet-d | selec | amid | | | top worm | springs | rad-rd. | l-ell. | l-ell. | left | cent. | Rowe TW |
| cent. | motor | 900 | 15 | Stromberg | pressure | wet-d | ind-c | amid | 3 | | top worm | springs | springs | l-ell. | l-ell. | right | right | Royal A |
| cent. | motor | 900 | 12 | Stromberg | pressure | wet-d | ind-c | unit-* | 3 | | tor-worm* | springs* | springs* | l-ell. | l-ell. | right | right | Royal A |
| cent. | motor | 900 | 15 | Stromberg | pressure | wet-d | ind-c | unit-j | 2 | | dbl chn. | | rad-rd. | l-ell. | l-ell. | right | right | Royal A |
| none | none | 3,200 | 25 | Scheibler | splash | wet-d | prog | amid | 2 | 11.32 -1 | sing chn. | | sub-f | l-ell. | ellip. | cent. | cent. | R-S |
| cent. | d-shaft | 1,300 | 14 | Zenith | pressure | wet-d | selec | unit-m | 3 | 7.00 -1 | top worm | springs | springs | l-ell. | l-ell. | left* | cent. | Salvador |
| cent. | motor | 1,000 | 20 | Stromberg | eire-spl | dry-d | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | l-ell. | l-ell. | right | cent. | Sandow |
| cent. | motor | 1,000 | 18 | Stromberg | eire-spl | dry-d | selec | unit-m | 3 | 7.00 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | right | cent. | Sandow |
| cent. | motor | 1,000 | 18 | Stromberg | eire-spl | dry-d | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | l-ell. | l-ell. | right | cent. | Sandow |
| cent. | motor | 1,000 | 14 | Stromberg | eire-spl | dry-d | selec | unit-m | 3 | 7.00 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | right | cent. | Sandow |
| cent. | motor | 1,000 | 15 | Stromberg | eire-spl | dry-d | selec | unit-m | 3 | 9.45 -1 | top worm | springs | springs | l-ell. | l-ell. | right | cent. | Sandow |
| none | none | 1,600 | 18 | Scheibler | eire-spl | dry-d | selec | unit-m | 3 | 6.53 -1 | int-gear | springs | springs | l-ell. | l-ell. | left | cent. | Sanford O |
| none | motor | 1,600 | 16 | Scheibler | eire-spl | dry-d | selec | unit-m | 3 | | int-gear* | springs | springs | l-ell. | l-ell. | left | cent. | Sanford P |
| cent. | motor | 1,500 | 14 | Scheibler | eire-spl | dry-d | selec | unit-m | 3 | 7.66 -1 | int-gear* | springs* | springs* | l-ell. | l-ell. | left | cent. | Sanford M |
| cent. | motor | 1,000 | 13½ | Faurer | spl-press. | cone | selec | unit-j | 4 | 10.00 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | right | right | Saurer |
| cent. | motor | 1,000 | 14 | Faurer | spl-press. | cone | selec | unit-j | 4 | 13.50 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | right | right | Saurer |
| none | none | 2,000 | 47 | Mayer | eire-spl | dry-d | prog | unit-x | 3 | 3.80 -1 | bevel | tor-t | tor-t. | cant. | cant. | left | cent. | Saxon |
| cent. | motor | 1,130 | 17 | Stromberg | eire-spl | dry-d | selec | unit-m | 3 | 6.75 -1 | top worm | springs | springs | l-ell. | l-ell* | cent. | Seldon T |
| cent. | motor | 1,135 | 14 | Stromberg | eire-spl | dry-d | selec | unit-m | 3 | 9.45 -1 | int-gear | springs | springs | l-ell. | l-ell* | cent. | Seldon JC |
| cent. | motor | 1,100 | 15 | Stromberg | eire-spl | dry-d | selec | unit-m | 3 | 9.25 -1 | top worm | springs | springs | l-ell. | l-ell. | cent. | Seldon JWL |
| cent. | motor | 1,250 | 13 | Stromberg | eire-spl | dry-d | selec | unit-m | 3 | 10.33 -1 | top worm | springs | rad-rd. | l-ell. | l-ell. | right | cent. | Seldon N |
| none | none | 1,200 | 16 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 6.70 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent. | Service 120 |
| cent. | motor | 1,000 | 14 | Stromberg | spl-press. | dry-p | selec | amid | 3 | 7.75 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent. | Service QW |
| cent. | motor | 970 | 14 | Stromberg | spl-press. | dry-p | selec | amid | 3 | 7.75 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent. | Service PW |
| cent. | motor | 900 | 11 | Stromberg | pressure | dry-p | selec | amid | 3 | 6.75 -1 | top worm | springs | rad-rd. | l-ell. | l-ell. | left | cent. | Service HW |
| cent. | motor | 900 | 10 | Stromberg | spl-press. | cone | selec | unit-j | 4 | 8.00 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | left | cent. | Service HX |
| cent. | motor | 1,200 | 15 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | l-ell. | l-ell* | cent. | Signal F |
| cent. | motor | 1,300 | 15 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 6.75 -1 | top worm | springs | springs | l-ell. | l-ell* | cent. | Signal H |
| cent. | motor | 1,300 | 15 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 9.45 -1 | top worm | springs | springs | l-ell. | l-ell* | cent. | Signal |
| cent. | motor | 1,300 | 18 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 10.33 -1 | top worm | rad-rd. | rad-rd. | l-ell. | l-ell. | cent. | Signal M |
| none | none | 1,600 | 25 | Stromberg | eire-spl | wet-d | selec | unit-m | 3 | 6.50 -1 | top worm* | springs | springs | l-ell. | l-ell. | right | South Bend 30 |
| none | none | 1,600 | 25 | Stromberg | eire-spl | wet-d | selec | unit-m | 3 | 5.50 -1 | top worm* | springs | springs* | l-ell. | l-ell. | right | South Bend 40 |
| none | none | 1,600 | 22 | Stromberg | eire-spl | wet-d | selec | unit-m | 3 | 5.50 -1 | top worm* | springs | springs | l-ell. | l-ell. | right | South Bend 40-7 |
| cent. | f-wheel | 1,200 | 15 | Stromberg | eire-spl | wet-d | selec | amid | 3 | 11.50 -1 | top worm | springs | springs | l-ell. | l-ell. | right | South Bend 40 |
| cent. | motor | 1,100 | 15 | Scheibler | eire-spl | cone | selec | amid | 3 | 7.75 -1 | top worm | springs | rad-rd. | l-ell. | l-ell. | left | cent. | Standard 18 |
| cent. | motor | 1,000 | 17 | Stromberg | eire-spl | dry-d | selec | unit-m | 3 | 10.33 -1 | top worm | springs | rad-rd. | l-ell. | l-ell. | left | cent. | Standard 40 |
| cent. | motor | 1,050 | 12 | Stromberg | eire-spl | dry-d | selec | unit-m | 3 | 9.50 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | left | cent. | Standard 40 |
| cent. | motor | 1,000 | 9 | Stromberg | eire-spl | dry-d | selec | unit-m | 3 | 13.00 -1 | top worm | tor-arm | rad-rd. | l-ell. | l-ell. | left | cent. | Standard 50 |
| none | none | 1,000 | 12 | Holley | eire-spl | dry-p | ind-c | amid | 3 | 9.00 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | right | right | Standard Tractor B |
| none | none | 1,000 | 24 | Holley | eire-spl | dry-p | ind-c | amid | 3 | 18.00 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | right | right | Standard Tractor D |
| none | none | 1,000 | 12 | Stromberg | spl-press. | dry-d | selec | amid | 4 | 9.00 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | left | cent. | Stearns |
| cent. | motor | 1,100 | 16 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | | top worm* | springs | springs* | l-ell. | l-ell. | e & l. | Stegeman |
| cent. | motor | 1,100 | 15 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | | top worm* | springs | springs* | l-ell. | l-ell. | e & l. | Stegeman |
| cent. | motor | 1,100 | 15 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | | top worm* | springs | springs* | l-ell. | l-ell. | e & l. | Special Stegeman |
| cent. | motor | 1,100 | 12 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 10.33 -1 | top worm* | springs | springs* | l-ell. | l-ell. | e & l. | Stegeman |
| none | none | 1,275 | 20 | Scheibler | eire-spl | dry-d | prog | unit-m | 3 | 7.00 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent. | Sterling |
| cent. | motor | 1,275 | 14½ | Holley | eire-spl | dry-d | selec | unit-m | 3 | 7.00 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent. | Sterling |
| cent. | motor | 1,275 | 15 | Holley | eire-spl | dry-d | selec | unit-m | 3 | 8.75 -1 | top worm | springs | springs | l-ell. | l-ell. | left | cent. | Sterling |
| cent. | motor | 975 | 16 | Holley | eire-spl | dry-d | selec | unit-m | 3 | 11.70 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | left | cent. | Sterling |
| cent. | motor | 975 | 16 | Holley | eire-spl | dry-d | selec | unit-m | 3 | 11.70 -1 | dbl chn. | springs | springs | l-ell. | l-ell. | left | cent. | Sterling |
| cent. | motor | 975 | 12 | Holley | eire-spl | dry-d | selec | unit-m | 3 | 11.70 -1 | dbl chn. | tor-arm | rad-rd. | l-ell. | l-ell. | left | cent. | Sterling |
| none | none | 1,500 | 25 | Zenith | eire-spl | dry-d | selec | unit-m | 3 | 4.00 -1 | int-gear | springs | springs | l-ell. | l-ell. | left | cent. | Stewart (B) 1 |
| none | none | 1,500 | 20 | Zenith | eire-spl | dry-d | selec | unit-m | 3 | 7.00 -1 | int-gear | springs | springs | l-ell. | l-ell. | left | cent. | Stewart (B) 1 |
| none | none | | 18 | Scheibler | pressure | dry-p | plan | unit-m | 2 | 7.00 -1 | dbl chn. | | rad-rd. | l-ell. | l-ell. | left | cent. | Stewart (C) A |
| none | none | | | Scheibler | eire-spl | cone | selec | unit-x | 3 | 4.50 -1 | bevel | tor-arm | rad-rd. | l-ell. | l-ell. | left | cent. | Studebaker SF |
| none | f-wheel | 900 | 20 | Scheibler | eire-spl | cone | selec | unit-x | 3 | 7.00 -1 | bevel | tor-arm | rad-rd. | l-ell. | l-ell. | left | cent. | Studebaker J |

**ABBREVIATIONS:** (continued). **Governor Type,** cent, *centrifugal*; l-b, *lever-ball*; suct, *suction*; hyd, *hydraulic*; elec, *electric*. **Governor Drive,** motor, *from motor*; d-shaft, *from driving shaft*; f-wheel, *from front wheel*; duplex, *from both the motor and driving shaft by corresponding clutches*. **Lubrication,** splash, *non-circulating or simple splash*; eire-spl, *circulating splash*; spl-press, *splash-pressure*; fuel-inj, *fuel injection, oil mixed with fuel*; pressure, *pressure feed, no splash*. **Clutch Type,** dry-p, *dry plate*; dry-d, *dry multi-pin disk*; wet-d, *wet disk or disk-in-oil*; wet-p, *wet plate or pi-in-o-il*; f-cone, *reversed cone or inverted cone*; cent-b, *contracting band*; exp-b, *expanding shoe*. **Gearset Type,** prog, *progressive si ding gear*; selec, *selective sliding gear*; plan, *planetary*; ind-c, *constant-mesh, individual-clutch*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidship*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Gearset Speeds,** inf, *infinite number*. **Final Drive,** int-g, *int-gear, internal-gear*; sing chn, *single chain*; dbl chn, *double chain*; double-red, *double reduction*; spur g, *spur gears*; sp-bev, *spiral bevel*; f, *front wheel or wheels*; d, *four-wheel drive*. **Torque Taken By,** rad-rd, *radius rod*; tor-arm, *torque arm*; tor-t, *torque tube*; sub-f, *sub-frame*. **Propulsion Taken By,** rad-rd, *radius rod*; tor-t, *torque tube*; tor-arm, *torque arm*; sub-f, *sub-frame*. **Springs,** ellip, *elliptic*; l-ell, *half elliptic*; f-ell, *quarter elliptic*; f-ell, *three-quarters elliptic*; plat, *platform*; cant, *cantilever*. **Control Levers** cent, *center*; e & r, *quarter-left center, brake right*; e & l, *quarter-left center, brake left*.

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# Specifications of Four Hundred Eight American

| Name and Model | Capacity in Pounds | Price of Chassis | Wheelbase in Inches | Kind | TIRES SIZES IN INCHES Front | Rear | Location | No. of Cylinders | No. of Crankshaft Bearings | Bore and Stroke | MOTOR N.A. C.C. Hp. | Cylinders Cast | Valves Placed | COOLING Water Circulation | Radiator Core and Case | IGNITION Type | Make | Spark Advance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sullivan G | 2,000 | 1,600 | 126 | solid | 36x5 | 36x4 | under hood | 4 | 3 | 3½x4½ | 22 50 | block | r & h | thermo | fin-sheet | mag | Bosch | fixed |
| Sullivan K | 2,800 | 2,250 | 150 | solid | 36x5 | 36x5 | under hood | 4 | 3 | 4x5½ | 42.23 | block | r & h | cent | fin-sheet | mag | Bosch | fixed |
| Superior A | 2,000 | 1,350 | 124 | solid* | 34x3½* | 34x4* | | 4 | 3 | 3½x5 | 19 61 | block | head | thermo | cell-sheet | mag | Eisemann | fixed |
| Superior C | 4,000 | 1,800 | 144 | solid* | 36x5 | 36x6 | under hood | 4 | 3 | 4x5½ | 32 50 | block | head | cent | cell-sheet | mag | Eisemann | fixed |
| Tiffin A-AC | 1,500 | 1,400* | 110 | solid | 34x3 | 34x3 | under hood | 4 | 3 | 3½x5 | 19 61 | block | right | thermo | fin-sheet | mag | Bosch | hand |
| Tiffin AA | 2,000 | 1,600 | 115 | solid | 34x3 | 34x3 | under hood | 4 | 3 | 3½x5 | 19 61 | block | right | thermo | fin-sheet | mag | Bosch | hand |
| Tiffin GL-GC | 3,000 | 2,000* | 126 | solid | 36x3½ | 36x3½ | under hood | 4 | 3 | 3½x5½ | 27.25 | block | left | cent | fin-sheet | mag | Bosch | hand |
| Tiffin MW-MC | 4,000 | 2,600* | 140 | solid | 36x5 | 36x5½ | under hood | 4 | 3 | 4½x5½ | 32 50 | block | left | cent | fin-sheet | mag | Bosch | hand |
| Tiffin RW-R | 10,000 | 4,250 | 168 | solid | 36x5 | 42x5 | under fr | 6 | 4 | 4½x5½ | 48 75 | three | right | cent | fin-sheet | mag | Bosch | hand |
| Tiffin SW-S | 10,000 | 3,850* | 168 | solid | 36x5 | 42x6 | under fr | 6 | 4 | 4½x5½ | 48 75 | three | right | cent | fin-sheet | mag | Bosch | hand |
| Tower | 4,000 | 1,600 | 125 | solid | 34x3½ | 34x3½ | under hood | 4 | | 3½x5 | 19 61 | block | left | thermo | sq-t-sheet | mag | Bosch | hand |
| Transit E | 2,000 | 2,000 | 130 | solid | 36x3½ | 36x3½ | under fr | 4 | 3 | 4½x5½ | 32 40 | pairs | left | cent | sq-t-sheet | mag | Bosch | hand |
| Transit F | 4,000 | 2,750 | 144 | solid | 36x4 | 36x4½ | btw seats | 4 | 3 | 4½x5½ | 32 40 | pairs | left | cent | sq-t-sheet | mag | Bosch | hand |
| Transit T | 7,500 | 3,750 | 144 | solid | 36x4 | 36x5 | btw seats | 4 | 3 | 4½x5½ | 32 40 | pairs | left | cent | sq-t-sheet | mag | Bosch | hand |
| Transit V | 10,000 | 4,500 | 144* | solid | 36x5 | 40x6½ | btw seats | 4 | 3 | 4½x5½ | 32 40 | pairs | left | cent | sq-t-sheet | mag | Bosch | hand |
| Transport Tractor T | 10,000 | 2,500 | 80 | solid | 34x4 | 34x5½ | btw seats | 4 | 3 | 3½x5½ | 19 61 | block | right | thermo | cell-sheet | mag | Bosch | fixed |
| Trumbull 16D | 500 | 340 | 80* | pneu | 28x3 | 28x3 | under hood | 4 | 2 | 2½x4 | 13 37 | block | right | thermo | fin-sheet | mag | Splitdorf | hand |
| Twin City | 2,000 | 1,350 | 104* | solid | 34x3 | 36x34 | under seats | 2 | 2 | 4 x5 | 20 00 | mag | thermo | fin-sheet | mag | K-W | hand |
| Twin City | 1,000 | 1,000 | 104* | solid | 34x3 | 36x34 | under seats | 2 | 2 | 3x5 | 19 61 | block | left | thermo | fin-sheet | mag | K-W | hand |
| Universal G | 3,000 | 1,650 | 130* | solid | 34x3 | 34x5 | under hood | 4 | 3 | 3½x5 | 22 50 | block | right | gear | fin-cast | mag | Eisemann | hand |
| Universal D | 4,000 | 2,000 | 132* | solid | 36x4 | 36x4 | under fr | 4 | 3 | 4 x5½ | 32 40 | pairs | right | gear | cell-sheet | dual | Eisemann | hand |
| Universal A | 4,500 | 2,400 | 132* | solid | 36x4 | 36x4 | under fr | 4 | 3 | 4 x5½ | 32 40 | pairs | opp | cent | sq-t-sheet | dual | | hand |
| United 4G | 3,000 | | | solid* | 34x3½ | 34x5 | under hood | 4 | | 3½x5 | 22 50 | block | right | cent | sq-t-sheet | mag | Eisemann | fixed |
| United BSW | 4,000 | 2,250 | 144* | solid* | 36x4 | 36x4½ | under hood | 4 | 3 | 4x5½ | 32 20 | block | left | cent | sq-t-sheet | mag | Eisemann | fixed |
| United CSW | 6,000 | 2,750 | 144* | solid | 36x5 | 36x5 | under hood | 4 | 3 | 4½x5½ | 32 40 | pairs | left | cent | sq-t-sheet | mag | Eisemann | fixed |
| United ESW | 10,000 | 3,500 | 144* | solid | 36x6 | 40x6 | under hood | 4 | 3 | 5x5½ | 42 40 | pairs | opp | cent | sq-t-sheet | mag | Eisemann | fixed |
| U. S H | 4,000 | 2,750 | 138 | solid | 34x4 | 36x4½ | under hood | 4 | 3 | 4½x5½ | 27 20 | block | left | cent | sq-t-sheet | dual | Bosch | hand |
| U. S J | 7,000 | 2,400 | 162 | solid | 36x5 | 40x5½ | under hood | 4 | 3 | 4½ | 32 40 | pairs | left | cent | sq-t-sheet | dual | Bosch | hand |
| U. S K | 10,000 | 3,250 | 168 | solid | 36x5 | 40x6½ | under hood | 4 | 3 | 4½ | 32 40 | pairs | left | cent | sq-t-sheet | dual | Bosch | hand |
| Valia 25 | 3,000 | 2,250 | 150 | solid | 36x4 | 36x5 | under hood | 4 | 3 | 4½x5½ | 27 20 | block | left | cent | fin-cast | mag | Bosch | hand |
| Valia 24 | 2,000 | 1,750 | 172 | solid | 36x4 | 36x5 | under hood | 4 | 3 | 4½x5½ | 27 20 | pairs | left | cent | fin-cast | mag | Bosch | hand |
| Vim 14 | 1,000 | 820 | 100 | pneu | 31x4 | 31x4 | under hood | 4 | 3 | 3 x4½ | 14 40 | block | right | thermo | fin-sheet | mag | Dixie | hand |
| Vulcan C | 4,000 | 2,750 | 142 | solid | 36x5 | 36x5½ | under hood | 4 | 3 | 4½x5½ | 32 40 | pairs | left | cent | cell-sheet | dual | Eisemann | auto |
| Vulcan T | 10,000 | 4,500 | 162 | solid | 36x5 | 40x6 | under hood | 4 | 3 | 5 x5½ | 40 00 | pairs | opp | cent | cell-sheet | dual | Eisemann | auto |
| Vulcan | 4,000 | 2,750 | 150* | solid | 36x4 | 34x3½ | under hood | 4 | 3 | 4½x5½ | 30 00 | pairs | left | thermo | sq-t-cast | dual | Remy | hand |
| Vulcan | 6,000 | 2,750 | 156* | solid | 36x5 | 34x4½ | under hood | 4 | 3 | 4½x5½ | 30 00 | pairs | left | thermo | sq-t-cast | dual | Remy | hand |
| Vulcan | 10,000 | 3,750 | 165 | solid | 36x5 | 36x5 | under hood | 4 | 3 | 4½x5½ | 30 00 | pairs | left | thermo | sq-t-cast | dual | Remy | hand |
| Walter | 10,000 | 4,750 | 144* | solid* | 40x6 | 40x5½ | under hood | 4 | 3 | 4½x6 | 30 65 | block | right | cent | fin-sheet | mag | Eisemann | auto |
| Walter | 12,000 | 5,000 | 144* | solid | 40x6 | 40x6 | under hood | 4 | 3 | 4½x6 | 30 65 | block | right | cent | fin-sheet | mag | Eisemann | auto |
| Walter | 15,000 | 5,250 | 144* | solid | 40x6 | 40x6 | under hood | 4 | 3 | 4½x6 | 30 65 | block | right | cent | fin-sheet | mag | Eisemann | auto |
| Walter Tractor | 42,000 | 9,000 | 162* | solid | 40x6 | 40x6 | under hood | 4 | 3 | 4½x6 | 30 65 | block | right | cent | fin-sheet | mag | Eisemann | auto |
| Watson | 10,000 | | 155 | s & rt | 40x6 | 53x5 | under hood | 4 | 3 | 4½x6 | 30 65 | block | right | cent | fin-sheet | mag | Eisemann | auto |
| White GBBE | 1,500 | 1,100 | 123 | pneu | 34x4½ | 34x4½ | under hood | 4 | 2 | 3½x5½ | 22 50 | block | right | cent | sq-t-sheet | mag | Bosch | hand |
| White TBC | 3,000 | 1,600 | 143 | pneu | 36x4½ | 36x4½ | under hood | 4 | 2 | 4 x5½ | 32 40 | block | right | cent | sq-t-sheet | mag | Bosch | hand |
| White TAD | 6,000 | 2,750 | 163 | solid | 36x5 | 40x5 | under hood | 4 | 2 | 4½x5½ | 32 50 | block | right | cent | sq-t-sheet | mag | Bosch | hand |
| White TCD | 10,000 | 3,750 | 163 | solid | 36x6 | 40x6 | under hood | 4 | 2 | 4½x5½ | 32 50 | block | right | cent | sq-t-sheet | mag | Bosch | hand |
| Wichita A | 2,000 | 1,650 | 110* | solid | 34x3 | 34x4 | under hood | 4 | 2 | 3½x5 | 16 02 | block | left | thermo | cell-sheet | mag | Dixie | hand |
| Wichita K | 3,000 | 2,250 | 118* | solid | 36x3 | 36x4 | under hood | 4 | 2 | 3½x5 | 19 61 | block | left | thermo | cell-sheet | mag | Dixie | hand |
| Wichita L | 3,000 | 2,300 | 118* | solid | 36x3 | 37x3 | under hood | 4 | 2 | 3½x5 | 19 61 | block | left | thermo | cell-sheet | mag | Dixie | hand |
| Wichita B | 4,000 | 2,750 | 124* | solid | 34x3½ | 34x3½ | under hood | 4 | 2 | 3½x5 | 19 61 | block | left | thermo | cell-sheet | mag | Dixie | hand |
| Wichita M | 4,000 | 2,750 | 124* | solid | 36x3½ | 36x3½ | under hood | 4 | 2 | 3½x5 | 19 61 | block | left | thermo | cell-sheet | mag | Dixie | hand |
| Wichita O | 7,000 | 2,750 | 160 | solid | 36x4 | 36x5 | under hood | 4 | 2 | 4½x5 | 25 20 | pairs | left | cent | cell-sheet | mag | Dixie | hand |
| Wilcox T | 2,000 | 1,000 | 115 | pneu | 34x4 | 34x4 | under hood | 4 | 3 | 3½x5 | 19 61 | block | left | thermo | fin-sheet | mag | Bosch | hand |
| Wilcox N | 1,000 | 1,000 | 100 | pneu | 30x4½ | 30x4½ | under hood | 4 | 3 | 3½x5 | 19 61 | block | left | thermo | fin-sheet | mag | Bosch | hand |
| Wilcox S | 2,000 | 1,600 | 128 | pneu* | 36x4½ | 36x5 | under hood | 4 | 3 | 3½x5 | 22 50 | block | left | | fin-sheet | mag | Bosch | hand |
| Wilcox R | 3,000 | 1,850 | 111 | solid | 36x4 | 36x4 | under hood | 4 | 3 | 4 x5 | 26 00 | pairs | right | cent | fin-sheet | mag | Bosch | hand |
| Witt-Will WD1 | 2,240 | 1,750 | 120 | solid | 36x3 | 36x4 | under hood | 4 | 3 | 3½x5 | 22 50 | block | left | cent | fin-sheet | mag | Eisemann | auto |
| Witt-Will WD2 | 2,850 | 2,250 | 141 | solid | 36x3½ | 36x3½ | under hood | 4 | 3 | 4½x5 | 32 20 | block | left | cent | fin-sheet | mag | Eisemann | auto |

## Received Too Late to Classify

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acason | 4,000 | 2,350 | 150 | solid | 34x3½ | 36x3½ | under hood | 4 | 3 | 4½x5 | 28 00 | pairs | left | cent | fin-cast | mag | Dixie | hand |
| Acason | 7,000 | 3,000 | 170 | solid | 36x4 | 36x5 | under hood | 4 | 3 | 4½x5 | 29 00 | pairs | left | cent | fin-cast | mag | Dixie | hand |
| Mogul LM | 3,000 | 1,600 | 125* | solid | 36x4 | 36x5 | under hood | 4 | 3 | 3½x5½ | 22 50 | block | left | cent | cell-cast | mag | Bosch | fixed |
| Mogul LW | 3,000 | 2,000 | 128* | solid | 36x4 | 36x5 | under hood | 4 | 3 | 4½x5½ | 27 20 | block | left | cent | cell-cast | mag | Bosch | fixed |
| Mogul L | 5,000 | 2,250 | 128* | solid | 36x5 | 36x6 | under hood | 4 | 3 | 4½x5½ | 27 20 | block | left | cent | cell-cast | mag | Bosch | fixed |
| Mogul T | 7,000 | 2,550 | 168* | solid | 36x5 | 36x6 | under hood | 4 | 3 | 4½x5½ | 32 40 | pairs | left | cent | cell-sheet | mag | Bosch | fixed |
| Phoenix Centipede | | | | steel | | | creeper | under hood | 4 | 4 | 3x7 | 48 48 | single | r & h | cent | sq-t-sheet | mag | Swinn | hand |
| Wilson E | 4,000 | 2,000 | 144 | solid | 36x4 | 36x4 | under hood | 4 | 3 | 4½x5½ | 27 20 | block | left | cent | fin-—— | mag | | fixed |

**ABBREVIATIONS: General** *, with other options; opt, optional. **Price**, -a, complete with body. **Tires**, Kind, Pneu, pneumatic; Cush, cushion; pneu, pneumatic in front and solid in rear; s & rt, solid in front and steel in rear. Tire Sizes, d, dual. **Motor** Location, btw seats, between seats; under fr, under floor. **Cylinders** Cast, sing, singly or individually. **Location of Valves**, opp, opposite or T-head form; top (two-cylinder motors only), L-head cylinder laid horizontal with valves up; r & h, at right and in hand, L-head cylinder; l & h, at left and in hand, L-head cylinder; 2-cyc, two-cycle motor, no valves. **Water Circulation**, cent, centrifugal pump; gear, gear pump; thermo, thermo-siphon circulation; air, air-cooled, no water. **Radiator Type and Case**, fin-sheet, finned-tube core with sheet metal casing; fin-cast, fin-tube core with cast aluminum casing; sq-t-sheet, square tube or flat tube core with sheet metal casing; sq-t-cast, square tube core with cast aluminum casing; cell-sheet, cellular or honeycomb core with sheet metal casing; cell-cast, cellular core with cast aluminum casing; s-t-sheet, zig-zag tube core with sheet metal casing; s-t-cast, zig-zag tube core with cast aluminum casing; mag-cast, copper tube core arranged in a ring about a cast-iron ring with a cast aluminum casing. **Ignition**, Type, sing, single; doub, double. **Make of Magneto** (or other sparking device), Atw, Kent, Atwater Kent. **Spark Advance**, auto, automatic; auto-s, automatic adjust, s with hand adjustment; 2-pt, two-point fixed, battery circuit fixed in retard, magneto in advance.

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# Gasoline Commercial Vehicles in Tabulated Form

| Governor Type | Governor Drive | Speed Motor in r.p.m. | Speed Truck in m.p.h. | Carburetor Make | Lubrication | Clutch Type | Gearset Type | Gearset Location | Gearset Speeds | Total Gear Reduction in High | Final Drive | Torque Taken By | Propulsion Taken By | Springs Front | Springs Rear | Control Steer | Control Levers | Name and Model |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ..... | ..... | ..... | ..... | Holley | spl-press. | cone | selec | unit-j | 3 | ..... | dbl chn | ..... | rad-rd. | j-ell. | plat. | left | cent | Sullivan G |
| ..... | ..... | ..... | ..... | Holley | spl-press. | dry-p | selec | unit-m | 3 | ..... | top worm | springs | springs | j-ell. | j-ell. | left | cent | Sullivan E |
| cent | motor | 1,200 | 17 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 7.00 -1 | int-gear | springs | springs | j-ell. | j-ell. | left | cent | Superior A |
| cent | motor | 1,100 | 15 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 7.75 -1 | int-gear | springs | springs | j-ell. | j-ell. | left | cent | Superior C |
| cent | motor | 1,000 | 15½ | Schebler | spl-press. | cone | selec | unit-m* | 3 | 9.60 -1 | int-gear*. | tor-arm. | rad-rd. | j-ell. | j-ell. | left | cent | Tiffin A-AC |
| cent | motor | 1,000 | 15 | Schebler | spl-press. | cone | selec | unit-m | 3 | 9.60 -1 | int-gear*. | tor-arm. | rad-rd. | j-ell. | j-ell. | left | cent | Tiffin Al |
| cent | motor | 1,000 | 12½ | Schebler | spl-press. | cone | selec | unit-m*. | 3 | 8.00 -1 | int-gear*. | tor-arm. | rad-rd. | j-ell. | j-ell. | left | cent | Tiffin GI-GC |
| cent | motor | 1,000 | 12 | Schebler | spl-press. | cone | selec | amid* | 3 | 8.00 -1 | top worm*. | tor-arm. | rad-rd. | j-ell. | j-ell. | left | cent | Tiffin MW-MC |
| cent | motor | 1,000 | 10 | Schebler | spl-press. | dry-p | selec | amid* | 4 | 12.20 -1 | top worm*. | tor-arm. | rad-rd. | j-ell. | j-ell. | left | cent | Tiffin RW-R |
| cent | motor | 1,000 | 10 | Schebler | spl-press. | dry-p | selec | amid* | 4 | 12.20 -1 | top worm*. | tor-arm. | rad-rd. | j-ell. | j-ell. | left | cent | Tiffin SW-S |
| ..... | ..... | 1,200 | 15 | Stromberg | circ-spl | dry-d | selec | unit-m | 3 | 6.75 -1 | top worm | springs | springs | j-ell. | j-ell. | left | cent | Tower ..... |
| cent | motor | 1,200 | 16 | Rayfield | circ-spl | wet-d | selec | unit-j | 3 | 7.50 -1 | dbl chn. | ..... | rad-rd. | j-ell. | j-ell. | right | right | Transit E |
| cent | motor | 1,200 | 14 | Rayfield | circ-spl | wet-d | selec | unit-j | 3 | 8.00 -1 | dbl chn. | ..... | rad-rd. | j-ell. | j-ell. | right | right | Transit F |
| cent | motor | 1,200 | 12 | Rayfield | circ-spl | wet-d | selec | unit-j | 3 | 10.00 -1 | dbl chn. | ..... | rad-rd. | j-ell. | j-ell. | right | right | Transit Y |
| cent | motor | 1,200 | 10 | Rayfield | circ-spl | wet-d | ind-c | unit-j | 3 | 12.00 -1 | dbl chn. | ..... | rad-rd. | j-ell. | j-ell. | right | right | Transit V |
| cent | d-shaft | 1,300 | 10 | Zenith | circ-spl | dry-d | selec | unit-m | 3 | 13.60 -1 | top worm | springs | springs | j-ell. | j-ell. | left | cent | Transport Tractor T |
| none | none | 2,200 | 45 | Zephyr | circ-spl | dry-d | selec | unit-s | 3 | 3.60 -1 | bevel | ..... | tor-t | tor-t | j-ell. | cant. | left*. | cent | Trumbull 16D |
| ..... | ..... | 1,500 | 15 | Schebler | circ-spl | dry-d | plan | unit-j | 2 | 10.00 -1 | dbl chn | ..... | rad-rd. | j-ell. | j-ell. | right | right | Twin City ..... |
| ..... | ..... | 1,500 | 15 | Schebler | circ-spl | dry-d | prog | unit-j | 3 | 10.00 -1 | dbl chn | ..... | rad-rd. | j-ell. | j-ell. | right | right | Twin City ..... |
| cent | motor | 1,100 | 15 | opt. | circ-spl | dry-p | selec | unit-m | 3 | 7.83 -1 | top worm | tor-arm. | rad-rd. | j-ell. | j-ell. | left | cent | Universal E |
| cent | motor | 1,125 | 13 | ..... | circ-spl | cone | selec | amid | 3 | 9.25 -1 | dbl chn | ..... | rad-rd. | j-ell. | j-ell. | left | cent | Universal D |
| cent | motor | 1,037 | 104 | opt. | circ-spl | cone | selec | unit-j | 3 | 10.33 -1 | dbl chn | ..... | rad-rd. | j-ell. | j-ell. | left | cent | Universal A |
| cent | motor | 1,800 | 15 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | ..... | top worm | springs | springs | j-ell. | j-ell. | left | cent | United AG |
| cent | motor | 1,500 | 15 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 6.75 -1 | top worm | springs | springs | j-ell. | j-ell. | left | cent | United RSW |
| cent | motor | 1,600 | 13 | Stromberg | spl-press. | dry-d | selec | unit-m | 3 | 8.75 -1 | top worm | springs | springs | j-ell. | j-ell. | left* | cent | United CSW |
| cent | d-shaft | 1,800 | 10 | Stromberg | spl-press. | dry-d | selec | amid | 4 | 11.75 -1 | top worm | springs | springs | j-ell. | j-ell. | right | right | United ESW |
| cent | motor | 1,200 | 15 | Stromberg | circ-spl | cone | ind-c | amid | 3 | 8.66 -1 | top worm | springs | springs | j-ell. | j-ell. | left* | cent | U. S. H |
| cent | motor | 1,170 | 12 | Stromberg | circ-spl | cone | ind-c | amid | 3 | 11.70 -1 | top worm | springs | springs | j-ell. | j-ell. | left* | cent | U. S. J |
| cent | motor | 1,196 | 11 | Stromberg | circ-spl | cone | ind-c | amid | 3 | 13.00 -1 | top worm | springs | springs | j-ell. | j-ell. | left* | cent | U. S. K |
| cent | motor | 1,000 | 16 | Stromberg | spl-press. | dry-d | selec | amid | 4 | 6.80 -1 | top worm | springs | springs | j-ell. | j-ell. | right | right | Velie 25 |
| cent | motor | 1,100 | 14 | Stromberg | spl-press. | dry-d | selec | amid | 4 | 10.30 -1 | top worm | tor-arm. | rad-rd. | j-ell. | j-ell. | right | right | Velie 26 |
| none | none | 1,230 | 25 | Stromberg | spl-press. | cone | selec | unit-m | 3 | 4.50 -1 | bevel | springs | springs | j-ell. | j-ell. | left | cent | Vim 18 |
| cent | motor | 1,000 | 15 | Rayfield | circ-spl | wet-d | selec | unit-j | 3 | 6.60 -1 | dbl chn | ..... | rad-rd. | plat. | plat. | left | cent | Volte C |
| cent | motor | 1,000 | 13 | Rayfield | circ-spl | wet-d | selec | unit j | 3 | 7.50 -1 | dbl chn. | ..... | rad rd. | plat. | plat. | left | cent | Volte T |
| cent | motor | 1,200 | 15½ | Stromberg | circ-spl | cone | selec | unit j | 3 | 7.87 -1 | dbl chn | ..... | rad rd. | j-ell. | j-ell. | right | right | Vulcan ..... |
| cent | motor | 1,200 | 15½ | Stromberg | circ-spl | cone | selec | unit-j | 3 | 7.87 -1 | dbl chn | ..... | rad-rd. | j-ell. | j-ell. | right | right | Vulcan ..... |
| cent | motor | 1,200 | 10 | Stromberg | circ-spl | cone | selec | unit-j | 3 | 12.00 -1 | dbl chn | ..... | rad-rd. | j-ell. | j-ell. | right | right | Vulcan ..... |
| cent | motor | ..... | ..... | Zenith | circ-spl | cone | selec | unit-m | 4 | ..... | spur-g-4 | springs | springs | j-ell. | j-ell. | left | cent | Walter ..... |
| cent | motor | ..... | ..... | Zenith | circ-spl | cone | selec | unit-m | 4 | ..... | spur-g-4 | springs | springs | j-ell. | j-ell. | left | cent | Walter ..... |
| cent | motor | ..... | ..... | Zenith | circ-spl | cone | selec | unit-m | 4 | ..... | spur-g-4 | springs | springs | j-ell. | j-ell. | left | cent | Walter ..... |
| cent | motor | ..... | ..... | Zenith | circ-spl | cone | selec | unit-m | 4 | ..... | spur-g-4 | springs | springs | j-ell. | j-ell. | left | cent | Walter Tractor |
| cent | motor | ..... | 14 | Zenith | circ-spl | cone | selec | unit-m | 4 | ..... | spur-g-f | springs | springs | j-ell. | coil | left | cent | Watson ..... |
| none | none | ..... | ..... | White | spl-press | wet-p | selec | amid | 4 | ..... | bevel | springs | rad-rd. | j-ell. | j-ell. | left | e & l | White GBBE |
| none | none | ..... | ..... | White | spl-press | wet-p | selec | amid | 4 | ..... | double-rd | springs | rad-rd. | j-ell. | j-ell. | left | e & l | White TBC |
| none | none | ..... | ..... | White | spl-press | wet-p | selec | amid | 4 | ..... | dbl chn | ..... | rad-rd. | j-ell. | j-ell. | left | e & l | White TAD |
| none | none | ..... | ..... | White | spl-press | wet-p | selec | amid | 4 | ..... | dbl chn | ..... | rad-rd. | j-ell. | j-ell. | left | e & l | White TCD |
| none | none | 1,080 | 15 | Stromberg | spl-press. | cone | selec | unit-j | 3 | 7.82 -1 | dbl chn | ..... | rad-rd | j-ell. | j-ell. | right | cent | Wichita A |
| none | none | 1,085 | 15 | Stromberg | spl-press. | cone | selec | amid | 3 | 7.90 -1 | top worm | springs | springs | j-ell. | j-ell. | right | cent | Wichita K |
| none | none | 1,200 | 15 | Stromberg | spl-press. | cone | selec | amid | 3 | 8.66 -1 | top worm | springs | springs | j-ell. | j-ell. | right | cent | Wichita L |
| none | none | 1,050 | 13 | Stromberg | spl-press. | cone | selec | unit-j | 3 | 8.24 -1 | dbl chn | ..... | rad-rd. | j-ell. | j-ell. | right | cent | Wichita B |
| none | none | 1,200 | 13 | Stromberg | spl-press. | cone | selec | amid | 3 | 10.67 -1 | top worm | springs | springs | j-ell. | j-ell. | right | Wichita M |
| cent | motor | 1,200 | 11 | Stromberg | circ-spl | cone | selec | amid | 3 | 11.75 -1 | top worm | springs | springs | j-ell. | j-ell. | right | Wichita O |
| cent | motor | 1,600 | 20 | opt. | circ-spl | dry-d | selec | unit-m | 3 | 6.00 -1 | bevel | tor-t | tor-t | j-ell. | j-ell. | left | cent | Wilcox T |
| cent | motor | 1,500 | 20 | opt. | circ-spl | dry-d | selec | unit-m | 3 | 6.20 -1 | top worm | springs | springs | j-ell. | j-ell. | left | cent | Wilcox N |
| cent | motor | 1,800 | 18 | opt. | circ-spl | dry-d | selec | unit-m | 3 | 6.80 -1 | top worm | springs | springs | j-ell. | j-ell. | left | cent | Wilcox S |
| cent | motor | 1,000 | 16 | opt. | circ-spl | cone | selec | amid | 3 | 7.70 -1 | top worm | springs | springs | j-ell. | j-ell. | left | cent | Wilcox R |
| cent | motor | 1,008 | 18 | Zenith | circ-spl | dry-d | selec | unit-m | 3 | 6.00 -1 | top worm | springs | springs | j-ell. | j-ell. | left | cent | Witt-Will WD1 |
| cent | motor | 1,085 | 15 | Zenith | circ-spl | dry-d | selec | unit-m | 3 | 7.75 -1 | top worm | springs | springs | j-ell. | j-ell. | left | cent | Witt-Will WD2 |

## Received Too Late to Classify

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| cent | motor | 1,200 | 18 | Schebler | circ-spl | dry-d | selec | unit-m | 4 | ..... | top worm | springs | springs | j-ell. | j-ell. | right | cent | Acason ..... |
| cent | motor | 1,200 | 15 | Schebler | circ-spl | dry-d | selec | unit-m | 4 | ..... | top worm | springs | springs | j-ell. | j-ell. | right | cent | Acason ..... |
| cent | motor | 1,200 | 15 | Carter | spl-press. | dry-p | selec | unit-m | 3 | 7.75 -1 | top worm | tor-t | rad-rd. | j-ell. | j-ell. | left | cent | Mogul LM |
| cent | motor | 1,200 | 15 | Carter | spl-press. | dry-p | selec | unit-m | 3 | 7.75 -1 | top worm | tor-t | rad-rd. | j-ell. | j-ell. | left | cent | Mogul LW |
| cent | motor | 1,200 | 15 | Carter | spl-press. | dry-p | selec | unit-m | 3 | 7.75 -1 | dbl chn | ..... | rad-rd. | j-ell. | j-ell. | left | cent | Mogul L |
| cent | motor | 1,200 | 15 | Carter | spl-press. | dry-p | selec | amid | 3 | 7.75 -1 | dbl chn | ..... | rad-rd. | j-ell. | j-ell. | left | cent | Mogul T |
| cent | motor | 700 | 5 | Kingston | splash | exp-s | ind-c | unit-j | 3 | ..... | int-gear | springs | springs | coil | coil | right | ..... | Phoenix Centipede ..... |
| cent | motor | 1,200 | 15 | ..... | circ-spl | cone | selec | amid | 3 | ..... | top worm | springs | springs | j-ell. | j-ell. | left | cent | Wilson E |

**ABBREVIATIONS:** (continued). **Governor Type,** cent, centr/spul; l-b, loose-ball; suct, suction; hyd, hydraulic; elec, electric. **Governor Drive,** motor, from motor; d-shaft, from driving shaft; f-wheel, from front wheel; duplex, from both the motor and driving shaft by overrunning clutches. **Lubrication,** splash, non-circulating or single splash; circ-spl, circulating splash; spl-press, splash-pressure; fuel-inj, fuel injection, oil mixed with fuel; pressure, pressure feed, no splash. **Clutch Type,** dry-p, dry plate; dry-d, dry multiple disk; wet-d, wet disk or disk-in-oil; wet-p, wet plate or plate-in-oil; f-cone, reversed cone or inserted cone; cont-b, contracting band; exp-s, expanding shoe. **Gearset Type,** prog, progressive sliding gear; selec, selective sliding gear; plan, planetary; ind-c, constant-mesh, individual-clutch; fric, friction; elec, electric. **Gearset Location,** amid, amidship; unit-m, unit with motor; unit-j, unit with jackshaft; unit-s, unit with axle. **Gearset Speeds,** inf, infinite as ahr. **Final Drive,** int-g, int-gear, internal-gear; ring chn, single chain; dbl chn, double chain; double-rd, double reduction; spur-g, spur gears; tp-bev, spiral bevel; f, front wheel or wheels; h, four-wheel driven. **Torque Taken By,** rad-rd, radius rod; tor-arm, torque arm; tor-t, torsion tube; sub-f, sub-frame. **Propulsion Taken By,** rad-rd, radius rod; tor-t, torsion tube; tor-arm, torque arm; sub-f, sub-frame. **Springs,** ellip, elliptic; j-ell, half elliptic; j-ell, quarter elliptic; f-ell, three-quarters elliptic; plat, platform; cant, cantilever. **Control, Levers,** cent, center; e & r, yearskift center, brake right; e & l, yearskift center, brake left.

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# Glossary of Electric Specification Terms

GROUPED and arranged so that each make occupies a separate group and each model a separate line, specifications of 1916 electric trucks and electric industrial vehicles appear on pages following. There are twenty-four separate chassis of the first class and ten of the industrials, representing a total of sixteen separate manufacturers. As in the gasoline specifications, each model occupies a line to itself, and there are thirty-four different items of information on each, except where manufacturers have failed to give THE COMMERCIAL VEHICLE official information relative to any of the particular points.

### Load Capacity

The load capacity of a motor truck is the maximum amount of load it is intended to carry in regular service, in addition to the weight of the body, the cab and the crew.

### Price of Chassis

The chassis price is the list price of the chassis, equipped with a standard seat or cab and all other standard equipment except the body, which is usually either selected from a stock of standard bodies or built to order, being charged for extra. Some makers, however, do not sell chassis not equipped with bodies, as indicated in the table by a small c following the price, representing that the price is for the **complete** vehicle.

Some chassis are not listed with their batteries, as such a wide range of option is given the purchaser on battery equipment that the chassis and the battery are each priced separately. Different batteries sell at widely differing prices, according to make and also according to type and capacity of the same make. Therefore, this year a separate column has been provided for the price without the battery. In cases where a price with the battery is given, this covers only the standard battery shown further on in the table.

### Wheelbase

The wheelbase of a truck is the longitudinal distance between centers of the axles, being measured in inches.

### Sizes of Tires

Tires are measured by their **diameter** and their **width**. The diameter is the total diameter from tread to tread, not including oversize which some makers give above and beyond the rated size. The width is the **base width**, not the **tread**. Tires

# Specifications of 79 1916 American

## Fifth Annual Tabulation of Details of Chassis, Motor Equipment and and Tractors Made by Sixteen Manufac

| Name and Model | Load Capacity in Pounds | Price of Chassis: With Battery | Price of Chassis: Without Battery | Wheelbase in Inches | Tires: Kind | Tires: Sizes in Inches: Front | Tires: Sizes in Inches: Rear | Battery: Location | Battery: Make and Type | Battery: No. Plates | Battery: No. Cells | Battery: No. Trays | Battery: Amp.-Hr. Capacity | Battery: Miles per Charge: Light | Battery: Miles per Charge: Loaded | Motor: Location and Number | Motor: Make | Motor: Winding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Baker ..... X | 1,000 | 1,900 | ... | 86 | solid | 36x3 | 36x3 | amid-u | Exide MV* | 9* | 42* | 6* | 112* | 65* | 45* | rear 1 | G.E. | series. |
| Baker ..... O | 2,000 | 2,300 | ... | 102 | solid | 36x3½ | 36x3½ | amid-u | Exide MV* | 11* | 42* | 7 | 140* | 55* | 40* | rear 1 | G.E. | series. |
| Baker ..... U | 4,000 | 2,900 | ... | 120 | solid | 36x4 | 36x3d | amid-u | Exide MV* | 13* | 42* | 6 | 168* | 51* | 40* | rear 1 | G.E. | series. |
| Baker ..... CC | 7,000 | 2,500 | ... | 137 | solid | 36x6 | 36x6d | amid-u | Exide MV* | 17* | 42* | 6 | 224* | 50* | 40* | rear 1 | G.E. | series. |
| Baker ..... EA | 10,000 | 3,850 | ... | 137 | solid | 36x7 | 38x5d | amid-u | Exide MV* | 19* | 42* | 6 | 252* | 40* | 35* | rear 1 | G.E. | series. |
| Commonwealth | 750 | 750 | 600 | 80 | solid | ..... | ..... | rear-u & h | Philadelphia* | 17 | 16 | 2 | 204 | ..... | ..... | 1 | G.E. | series. |
| Couple-Gear Tractor HF1 | 4,000 | 2,250 | 1,850 | 80 | solid | 36x5 | 30x3½ | amid-u | U.S.L.-WBT | 15 | 40 | 4 | 175 | 30 | 25 | in wheel-1 | Couple-Gear | series. |
| Couple-Gear H | 7,000 | 4,200 | 3,600 | 96 | solid | 36x6d | 36x4d | amid-u | U.S.L.-WBT | 25 | 44 | 6 | 275 | 40 | 30 | in wheel-1 | Couple-Gear | series. |
| Couple-Gear A | 10,000 | 4,900 | 4,100 | 98 | solid | 36x5d | 36x5d | amid-u | U.S.L.-WBT | 27 | 44 | 6 | 300 | 35 | 25 | in wheel-1 | Couple-Gear | series. |
| Couple-Gear AF | 12,000 | 3,800 | 3,200 | 116* | s & rt. | 36x5d | 60x5 | amid-u | U.S.L.-WBT | 29 | 48 | 6 | 325 | 40 | 35 | in wheel-2 | Couple-Gear | series. |
| C.T. | 1,000 | ..... | 1,640 | 90* | solid | 36x2½ | 36x3 | amid-u | Edison-A4* | ..... | 60* | 6* | 150* | ..... | ..... | unit-s-2 | G.E. | series. |
| C.T. | 2,000 | ..... | 2,095 | 100* | solid | 36x3½ | 36x4 | amid-u | Edison-A6* | ..... | 60* | 6* | 225* | ..... | ..... | unit-s-2 | G.E. | series. |
| C.T. | 4,000 | ..... | 2,725 | 116 | solid | 36x5 | 36x3d | amid-u | Edison-A8* | ..... | 60* | 8* | 300* | ..... | ..... | unit-s-2 | G.E. | series. |
| C.T. | 7,000 | ..... | 3,530 | 115* | solid | 36x5d | 36x4d | amid-u | Edison-A10* | ..... | 60* | 8* | 375* | ..... | ..... | unit-s-4 | G.E. | series. |
| C.T. | 10,000 | ..... | 3,935 | 132* | solid | 36x6d | 36x5d | amid-u | Edison-A12* | ..... | 60* | 8* | 450* | ..... | ..... | unit-s-4 | G.E. | series. |
| G.M.C. 1 | 1,000 | 1,580 | 1,200 | 106* | solid | 32x3 | 32x3 | amid-u | Edison-A4* | ..... | 60* | ..... | 150* | 50* | 45* | rear-1 | G.E. | series. |
| G.M.C. 2 | 2,000 | 1,740 | 1,300 | 118* | solid | 32x3½ | 32x4 | amid-u | Edison-A5* | ..... | 60* | ..... | 187 5* | 50* | 42* | rear-1 | G.E. | series. |
| G.M.C. 3 | 3,000 | 1,940 | 1,450 | 130* | solid | 32x4 | 32x5d | amid-u | Edison-A6* | ..... | 60* | ..... | 225* | 50* | 40* | rear-1 | G.E. | series. |
| G.M.C. 4 | 4,000 | 2,240 | 1,650 | 138* | solid | 32x4 | 32x5d | amid-u | Edison-A7* | ..... | 60* | ..... | 225* | 40* | 32* | rear-1 | G.E. | series. |
| G.M.C. 7 | 7,000 | 2,560 | 2,000 | 150* | solid | 32x5 | 36x4d | amid-u | Edison-A8* | ..... | 60* | ..... | 300* | 41* | 32* | rear-1 | G.E. | series. |
| G.M.C. 10 | 10,000 | 2,960 | 2,350 | 166* | solid | 36x6 | 36x6d | amid-u | Edison-A10* | ..... | 60* | ..... | 375* | 35* | 27* | rear-1 | G.E. | series. |
| G.M.C. 12 | 12,000 | 3,720 | 2,800 | 174* | solid | 36x6 | 36x7d | amid-u | Edison-A10* | ..... | 60* | ..... | 375* | 32* | 24* | rear-1 | G.E. | series. |
| G.V. | 1,000 | ..... | ..... | 88 | solid | 36x2½ | 36x2½ | amid-u | Philadelphia WTX* | 13* | 44* | 4* | 153* | ..... | 50*† | rear-1 | G.E. | series. |
| G.V. | 1,000 | ..... | ..... | 102 | solid | 36x3 | 36x3 | u-hood | Philadelphia WTX* | 15* | 44* | 4* | 178 5* | ..... | 65*† | amid-1 | G.E. | series. |
| G.V. | 2,000 | ..... | ..... | 103 | solid | 36x3½ | 36x3½ | amid-u | Philadelphia WTX* | 17* | 44* | 5* | 204* | ..... | 55*† | rear-1 | G.E. | series. |
| G.V. | 4,000 | ..... | ..... | 111 | solid | 36x4 | 36x3d | amid-u | Philadelphia WTX* | 21* | 44* | 6 | 225* | ..... | 55*† | rear-1 | G.E. | series. |
| G.V. | 7,000 | ..... | ..... | 134 | solid | 36x5 | 36x6d | amid-u | Philadelphia WTX* | 27* | 44* | 6 | 321* | ..... | 50*† | rear-1 | G.E. | series. |
| G.V. | 10,000 | ..... | ..... | 139 | solid | 36x7 | 36x5d | amid-u | Philadelphia WTX* | 31* | 44* | 6 | 382* | ..... | 45*† | rear-1 | G.E. | series. |
| Lansdon S | 750 | 1,850 | 1,175 | 90 | cush | 34x3 | 34x4 | u-rear | Edison-A4 | ..... | 60 | 10 | ..... | ..... | 60 | unit-s-1 | G.E. | series. |
| Lansdon M | 1,000 | 2,310 | 1,500 | 90 | solid | 36x2½ | 36x3 | amid-u | Edison-A4 | ..... | 60 | 10 | ..... | ..... | 60 | unit-j-1 | G.E. | series. |
| Lansdon M | 2,000 | 2,900 | 1,900 | 96 | solid | 36x3 | 36x3½ | amid-u | Edison-A6 | ..... | 60 | 10 | ..... | ..... | 60 | unit-j-1 | G.E. | series. |
| Lansdon M | 4,000 | 3,660 | 2,100 | 120 | solid | 36x4 | 36x3d | amid-u | Edison-A8 | ..... | 60 | 10 | ..... | ..... | 50 | unit-j-1 | G.E. | series. |
| Lansdon M | 7,000 | 4,455 | 2,475 | 130 | solid | 36x5 | 36x4d | amid-u | Edison-A10 | ..... | 60 | 10 | ..... | ..... | 50 | unit-j-1 | G.E. | series. |
| Lansdon M | 10,000 | 5,190 | 2,850 | 142 | solid | 36x6 | 36x5d | ..... | Edison-A12 | ..... | 60 | 10 | ..... | ..... | 50 | rear-1 | G.E. | series. |
| Lansdon Tractor | 20,000 | 3,600 | 2,100 | 58 | solid | 30x4 | 30x5 | amid-u | Edison A8 | ..... | 60 | 10 | ..... | ..... | 60 | rear-1 | G.E. | series. |
| Walker M | 1,000 | ..... | ..... | 90* | solid | 34x3 | 36x3½ | amid-u | opt | ..... | ..... | ..... | ..... | ..... | ..... | unit-s-1 | Westinghouse | series. |
| Walker K | 2,000 | ..... | ..... | 92* | solid | 34x3½ | 34x4 | amid-u | opt | ..... | ..... | ..... | ..... | ..... | ..... | unit-s-1 | Westinghouse | series. |
| Walker I | 4,000 | ..... | ..... | 107* | solid | 34x4 | 34x6 | amid-u | opt | ..... | ..... | ..... | ..... | ..... | ..... | unit-s-1 | Westinghouse | series. |
| Walker D | 6,000 | ..... | ..... | 126* | solid | 36x5 | 38x5 | amid-u | opt | ..... | ..... | ..... | ..... | ..... | ..... | unit-s-1 | Westinghouse | series. |
| Walker E | 9,000 | ..... | ..... | 130* | solid | 36x6 | 38x5d | amid-u | opt | ..... | ..... | ..... | ..... | ..... | ..... | unit-s-1 | Westinghouse | series. |
| Walker N | 10,000 | ..... | ..... | 130* | solid | 36x7 | 38x6d | amid-u | opt | ..... | ..... | ..... | ..... | ..... | ..... | unit-s-1 | Westinghouse | series. |
| Walker Tractor DA | 20,000 | ..... | ..... | 74* | solid | 34x4 | 34x6 | rear-u | opt | ..... | ..... | ..... | ..... | ..... | ..... | unit-s-1 | Westinghouse | series. |

**ABBREVIATIONS: General**, *, *with other options*; opt, *optional*. **Tires, Kind**, cush, *cushion*; s & rt, *solid in front and steel in rear*. **Tire Sizes, d**, *dual*. **Battery, Location**, amid-u, *amidships, underframe below frame*; amid-o, *amidships over frame*; rear-u, *at rear, over frame*; rear-u & h, *at rear under frame and also under a hood forward*; u-hood, *under hood*; front-u, *in front, under frame*; u-seat, *under seat*; cush-u, *at both ends, over frame*. **Battery, Make and Type**, Exide-Ir, *Exide-Ironclad type*. **Miles per Charge, Loaded**, †, *half way light, half loaded*. **Motor, Location and Number**, amid, *amidships*; unit-j, *unit with jackshaft*; unit-s, *unit with axle*. Numbers following *refer to number of motors in chassis*.

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# The Terminology of Vehicle Construction

of equal base width often vary in tread width, owing to different contour. Rubber tires are made in **single** and **dual**, a dual tire being two single tires on one rim. When a tire is specified as a certain size **dual** this represents two tires of that size on one wheel.

### Battery Location

There are two principal methods of carrying the battery, the first is that in which the battery is carried under the floor, beneath the frame, so that the space above the frame is clear so that any type of body may be fitted. A vehicle so made is said to be of the **platform type**, or to carry its battery **amidships, underslung**. The other standard battery location is above the frame and partially under the seat, or amidships, over the frame. Other battery locations are at the rear, above the frame; at the rear, below the frame; at the front, above the frame; at the front, below the frame; under a hood; under the seats; and, when divided into two sections, under the hood and amidships, and under the hood and under the seat.

Among industrial trucks practically the same battery locations are used as on street vehicles. One location peculiar to this class is that in which the battery is carried in two sections, one at each end, on top of the frame. This is found in tractors, the battery boxes serving as seats for the operator.

### Number of Plates

A storage cell consists of a jar of rubber or similar substance, in a lead battery, or of steel in the Edison make, in which there are a number of plates arranged like the leaves of a book. Half of these are positive and half negative. The capacity of the cell depends upon the surface of these plates, so that the greater the number of plates in a given size of cell, the greater its capacity. **Lead** batteries have plates of a soft, spongy paste of pure lead, alternating with plates pasted with peroxide of lead. The Edison or **alkali** battery uses plates of steel alternating with plates of nickel-hydrate. The lead battery plates are immersed in a sulphuric acid solution, and those of the alkali type, in an alkaline fluid.

### Battery, Number of Cells

A storage battery consists of a number of cells, as described above. Each cell has a voltage of approximately 2, so that to secure a voltage high enough for the rest of the

# Electric Commercial Vehicle Chassis

## Batteries of Domestic Electric and Electric Industrial Motor Trucks

## turers, for Convenient Comparison

| Motor | | | | Controller | | | Drive | | | | | Springs | | Control | | Name and Model |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Speed in Miles per Hour | | | Speeds | | Gearing | | | | | | | | | |
| Horse-power | Voltage | Light | Loaded | Location | F'w'd | Rear | First Reduction | Final Reduction | Total Gear Ratio | Torque Taken By | Propulsion Taken By | Front | Rear | Steer | Controller Lever | |
| 3 | 80 | 14½ | 13 | u-seat | 5 | 3 | s-chain | dbl-chn | 10 60-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | Baker X |
| 3½ | 85 | 12½ | 10½ | u-seat | 5 | 3 | s-chain | dbl-chn | 10 00-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | Baker O |
| 4 | 85 | 10 | 9 | u-seat | 5 | 3 | s-chain | dbl-chn | 14 00-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | Baker U |
| 4½ | 85 | 9 | 8 | u-seat | 5 | 3 | s-chain | dbl-chn | 16 20-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | Baker CC |
| 5 | 85 | 8 | 7 | u-seat | 5 | 3 | s-chain | dbl-chn | 19 00-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | Baker EA |
| | | 14 | | | 4 | 2 | none | herring | | tor-t | | l-ell | l-ell | lever-l | l-seat | Commonwealth |
| 3 | 80 | 10 | 7 | btw seats | 4 | 4 | none | bevel-f | 25 60-1 | springs | springs | l-ell | l-ell | wheel-r | btw seats | Couple-Gear Tractor HFt |
| 12 | 88 | 10 | 8 | btw seats | 5 | 5 | none | bevel-4 | 25 60-1 | tor-arm | rad-rd | l-ell | l-ell | wheel-r | btw seats | Couple-Gear H |
| 12 | 88 | 8 | 7 | btw seats | 5 | 5 | none | bevel-4 | 25 60-1 | tor-arm | rad-rd | l-ell | l-ell | wheel-r | btw seats | Couple-Gear A |
| 8 | 96 | 7 | 6 | btw seats | 4 | 4 | none | bevel-f | 25 00-1 | tor-arm | rad-rd | l-ell | l-ell | wheel-r | btw seats | Couple-Gear AF |
| 2½ | 60* | 15 | 13 | u-floor | 4 | 2 | spur gear | spur gear | 10 00-1 | springs | rad-rd | l-ell | l-ell | wheel-l | u-wheel | C.T. |
| 3½ | 60* | 14 | 12 | u-floor | 4 | 2 | spur gear | spur gear | 11 30-1 | springs | rad-rd | l-ell | l-ell | wheel-l | u-wheel | C.T. |
| 5 | 60* | 12 | 10 | u-floor | 4 | 2 | spur gear | spur gear | 12 14-1 | springs | rad-rd | l-ell | l-ell | wheel-l | u-wheel | C.T. |
| 7 | 60* | 11 | 9 | u-floor | 4 | 2 | spur gear | spur gear-4 | 17 32-1 | springs | rad-rd | l-ell | l-ell | wheel-l | u-wheel | C.T. |
| 7 | 60* | 9 | 7 | u-floor | 4 | 2 | spur gear | spur gear-4 | 20 14-1 | springs | rad-rd | l-ell | l-ell | wheel-l | u-wheel | C.T. |
| 2½ | 80* | | 13 | u-hood | 5 | 1 | bevel | dbl-chn | 8 40-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | G.M.C. 1 |
| 3½ | 60* | | 12 | u-hood | 5 | 1 | bevel | dbl-chn | 11 00-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | G.M.C. 2 |
| 4 | 60* | | 11 | u-hood | 5 | 1 | bevel | dbl-chn | 12 20-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | G.M.C. 3 |
| 4 | 60* | | 10 | u-hood | 5 | 1 | bevel | dbl-chn | 12 20-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | G.M.C. 4 |
| 2½ | 60* | | 8 | u-hood | 5 | 1 | bevel | dbl-chn | 12 70-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | G.M.C. 7 |
| 7 | 60* | | 7½ | u-hood | 5 | 1 | bevel | dbl-chn | 15 70-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | G.M.C. 10 |
| 7 | 60* | | 6½ | u-hood | 5 | 1 | bevel | dbl-chn | 15 70-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | G.M.C. 12 |
| 2 | 85* | 14 | 12 | u-seat | 5 | 2 | s-chain | dbl-chn | 11 80-1 | | rad-rd | l-ell | l-ell | wheel-l | l-seat | G.V. |
| 2 | 85* | 14 | 12 | u-seat | 5 | 2 | none | l-spur-gear | 9 00-1 | springs | springs | l-ell | l-ell | wheel-l | l-seat | G.V. |
| 2½ | 85* | 12 | 10 | u-seat | 5 | 2 | s-chain | dbl-chn | 10 70-1 | | rad-rd | l-ell | l-ell | wheel-l | l-seat | G.V. |
| 2½ | 85* | 11 | 9 | u-seat | 5 | 2 | s-chain | dbl-chn | 11 81-1 | | rad-rd | l-ell | l-ell | wheel-l | l-seat | G.V. |
| 4 | 85* | 10 | 8 | u-seat | 5 | 2 | s-chain | dbl-chn | 11 85-1 | | rad-rd | l-ell | l-ell | wheel-l | l-seat | G.V. |
| 5 | 85* | 9 | 7 | u-seat | 5 | 2 | s-chain | dbl-chn | 13 55-1 | | rad-rd | l-ell | l-ell | wheel-l | l-seat | G.V. |
| | 60 | | 15 | u-hood | 4 | 2 | spur gear | bevel | 12 00-1 | tor-arm | springs | l-ell | l-ell | wheel-l | u-wheel | Lansden S |
| | 60 | | 12 | u-hood | 4 | 2 | bevel | dbl-chn | 8 00-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | Lansden M |
| | 60 | | 10 | u-hood | 4 | 2 | bevel | dbl-chn | 10 00-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | Lansden M |
| | 60 | | 9 | u-hood | 4 | 2 | bevel | dbl-chn | 11 00-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | Lansden M |
| | 60 | | 7 | u-hood | 4 | 2 | bevel | dbl-chn | 15 00-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | Lansden M |
| | 60 | | 8 | u-hood | 4 | 2 | bevel | dbl-chn | 15 50-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | Lansden M |
| | 60 | 8 | 5 | u-seat | 4 | 2 | s-chain | dbl-chn | 9 00-1 | | rad-rd | l-ell | l-ell | wheel-l | u-wheel | Lansden Tractor |
| | | 15 | 14 | u-seat | 5 | 3 | none | spur gear | 12 00-1 | springs | springs | l-ell | l-ell | wheel-l* | left | Walker M |
| | | 14 | 13 | u-seat | 5 | 3 | none | spur gear | 12 00-1 | springs | springs | l-ell | l-ell | wheel-l* | left | Walker K |
| | | 12 | 12 | u-seat | 5 | 3 | none | spur gear | 12 00-1 | springs | springs | l-ell | l-ell | wheel-l* | left | Walker L |
| | | 11 | 10 | u-seat | 5 | 3 | none | spur gear | 15 00-1 | springs | springs | l-ell | l-ell | wheel-l* | left | Walker D |
| | | 11 | 10 | u-seat | 5 | 3 | none | spur gear | 15 00-1 | springs | springs | l-ell | l-ell | wheel-l* | left | Walker E |
| | | 11 | 13 | u-seat | 5 | 3 | none | spur gear | 11 00-1 | springs | springs | l-ell | l-ell | wheel-l* | left | Walker N |
| | | 8 | 6 | u-seat | 5 | 3 | none | spur gear | | tor-arm | tor-arm | l-ell | l-ell | wheel-l | left | Walker Tractor DK |

ABBREVIATIONS: (continued): Controller, Location, u-seat, under seat; u-floor, under floor or cab; u-hood, under hood; btw seats, between seats. Drive, Gearing, First Reduction, s-chain, silent chain. Final Reduction, dbl chn, double chain; spur-g, spur-gear; herring, herringbone gear; d-f, bevel differential gear; bevel, bevel gear. Torque Taken By, tor-arm, torque arm; tor-t, torque tube; sub-f, sub-frame. Propulsion Taken By, rad-rd, radius rod; sub-f, sub-frame. Springs, thls, dbl ell, l-ell, half-elliptic; f-ell, full-elliptic; trans-t, transverse. A shaft or reversed elliptic. Control, Steer, -l, to the left or, to the right; -c, in the center. Controller Lever, u-wheel, under steering wheel; l-wheel, to left of wheel; r-wheel, to right of wheel; l-seat, to left of seat; btw seats, between seats; cent, center.

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vehicle, it is not possible to use one large cell with sufficient and large enough plates to give the required amperage, but it is necessary to have a number of cells, for each cell added to the battery increases the voltage by 2.

**Battery, Number of Trays**

The different cells of a battery are grouped in **trays**, or crates which may be picked up and handled independently of the rest of the battery. Each tray is in reality a small battery, but when wired in connection with other trays, it becomes a part of the whole.

**Ampere-hour Capacity**

Ampere-hour capacity is the measure of the current in a battery. It represents the amperes of charge that may be held by the battery multiplied by the number of hours, at normal discharge rates, it will require to discharge the battery to the minimum safe limit. Thus, if a battery have a charge of 40 amperes, and discharges in 5 hours, it is said to have 200 ampere-hours capacity.

**Mileage Per Charge**

The manufacturer's figures are given in this instance, as there is no means of accurately determining this from the ampere-hour capacity or other information given.

**Motor Location and Number**

Electric vehicles are driven by one or more motors, located in seven different places in the chassis. These are **amidships; unit with the axle, unit with the jackshaft,** to the **rear of the chassis, in the front of the chassis,** in the **front wheel** or wheels, and **in the wheels.** When the motor is a unit with the axle it either drives through gears in or on the wheels or by bevel or worm gears direct to the axle. When it is a unit with the wheels or a wheel, it is incorporated with the wheel and inclosed by it, driving by bevel pinions to the bevel-toothed felloe of the wheel.

**Motor Winding**

In American electric vehicle practice, but one type of winding is employed, the **series** form. Series winding is that in which all of the current is obliged to pass first through the armature and then through the field, the same size of wire being used in both field and armature windings.

**Motor Horsepower**

This figure refers to the rated electrical horsepower of the motor.

**Motor Voltage**

Motor voltage as given, is the rated voltage at which the motor is designed to operate. In general, the voltage of a battery at full charge is slightly more than 2 volts per cell, when all cells are wired in series. Thus, a 44-cell battery under full charge will give in excess of 90 volts.

**Speed in Miles Per Hour**

This figure is the manufacturer's figure for the maximum speed attainable on average roads. Two figures are given, with the vehicle light and with it loaded.

**Controller Location**

The controller is the means by which the current is controlled in its passage from the battery to the motor and return. To avoid severe strains from starting too suddenly, it is necessary that the current flow be restricted in starting, this restriction to flow being gradually diminished as the motor takes up its work and the vehicle speed increases. It is also necessary to provide a means of running the vehicle

# Specifications of Seventy-nine American Ele

| Name and Model | | Load Capacity in Pounds | Price of Chassis: With Battery | Price of Chassis: Without Battery | Wheelbase in Inches | Tires: Kind | Tires: Sizes in Inches: Front | Tires: Sizes in Inches: Rear | Location | Battery: Make and Type | Battery: No. Plates | Battery: No. Cells | Battery: No. Trays | Battery: Amp.-Hr. Capacity | Battery: Miles per Charge: Light | Battery: Miles per Charge: Loaded | Motor: Location and Number | Motor: Make | Motor: Winding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ward | WS | 750 | | | 88 | solid | 32x2½ | 32x2½ | u-seat | | 9 | 42 | 3 | 100 | | 45 | amid-1 | | series |
| Ward | EO | 1,000 | | | 90 | solid | 32x2½ | 34x3 | amid-u | | 11 | 42 | 3 | 127 | | 45 | amid-1 | | series |
| Ward | EA | 2,000 | | | 99 | solid | 34x3 | 36x4 | amid-u | | 13 | 42 | | 153 | | 40 | amid-1 | | series |
| Ward | EB | 4,000 | | | 111 | solid | 36x4 | 38x6 | amid-u | | 17 | 42 | | 204 | | 35 | amid-1 | | series |
| Ward | EC | 7,000 | | | 132 | solid | 36x6 | 40x4½ | amid-u | | 23 | 42 | | 280 | | 30 | amid-1 | | series |
| Ward | ED | 10,000 | | | 159 | solid | 40x4½ | 42x5 | amid-u | | 29 | 42 | | 357 | | 25 | amid-1 | | series |
| Waverley | 83 | 1,000 | 1,800 | 1,575 | 90 | cush | 34x2½ | 34x2½ | amid-u | Exide* | 11 | 42 | 6 | | | 50 | rear-1 | Waverley | series |
| Waverley | | 2,000 | 2,150 | | 104 | solid | 35x5 | 35x5 | amid-u | Exide* | 15 | 42 | | | | 45 | rear-1 | G.E. | series |
| Waverley | | 4,000 | 3,000 | | 114 | solid | 37x5 | 37x6 | amid-u | Exide* | 17 | 42 | | | | 35 | rear-1 | G.E. | series |
| Waverley | | 7,000 | 3,400 | | 127 | solid | 37x5 | 37x5d | amid-u | Exide* | 21 | 42 | | | | 35 | rear-1 | G.E. | series |
| Waverley | | 10,000 | 3,950 | | 136 | solid | 37x7 | 37x7d | amid-u | Exide* | 25 | 42 | | | | | rear-1 | G.E. | series |

## Industrial Trucks

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Buda | A | | | | 44 | solid | 16x3 | 16x3 | amid-u | Exide-Ir* | 11* | 16* | 2 | 157† | | | unit-s-1 | | series |
| Buda | | | | | 52 | solid | 10x3½ | 16x3 | rear-o | Exide-Ir* | 11 | 15* | 1 | 157† | | | unit-s-1 | | series |
| Buda | B | 4,000 | | | 40 | solid | 16x3 | 16x3 | rear-o | Exide-Ir* | 9* | 30* | 2* | 252* | | | front-1 | | series |
| Buda | B-1 | | | | 36 | solid | 16x3 | 16x3 | ends-o | Exide-Ir* | 9* | 30* | 2 | 252* | | | unit-s-1 | | series |
| Buda | CE | 4,000 | | | 52 | solid | 10x3½ | 16x3 | rear-o | Exide-Ir* | 11* | 15* | 1 | 157† | | | front-1 | | |
| Dynamic | A | 4,000 | | | 60 | solid | 20x3½ | 20x3½ | amid-u | | | | | | | | amid-1 | Westinghouse | |
| Dynamic | B | 6,000 | | | 60 | solid | 20x3½ | 20x3½ | amid-u | | 9* | 24* | 2* | 136* | | | amid-1 | Westinghouse | series |
| Dynamic Tractor | BC | 20,000 | | | 60 | solid | 20x3½ | 20x3½ | ends-o | Exide-Ir. | 8* | | | | | | amid-1 | Westinghouse | series |
| Electromobile | A | 3,000 | | | 43* | solid | 20x3 | 20x3 | amid-u | Exide* | 9* | 15* | 1 | 100* | | | unit-j-1 | Wagner | series |
| Electromobile | D | 4,000 | | | 60* | solid | 20x3½ | 20x3½ | amid-u | Exide* | 11* | 24* | 2 | 123* | | | unit-j-1 | Wagner | series |
| Electromobile | B | 2,000 | | | 52* | solid | 20x3 | 20x3 | amid-u | Exide* | 9* | 24* | 2 | 100* | | | unit-j-1 | Wagner | series |
| Electromobile | C | 4,000 | | | 52* | solid | 20x3½ | 20x3½ | amid-u | Exide* | 15* | 12* | 1 | 220* | | | unit-j-1 | Wagner | series |
| Electromobile Tractor | E | | | | 30 | solid | 20x3 | 20x3 | amid-u | Exide* | 13* | 24 | 2 | 150* | | | unit-j-1 | Wagner | series |
| Elwell-Parker | SA-SC-SE | | | | | solid | 27x3½ | 27x3½ | front-u | lead* | 15* | 12* | | 196* | | | front | | series |
| Elwell-Parker | DD-DG | | | | | solid | 27x3½ | 27x3½ | front-u | lead* | 15* | 12* | 1* | 196* | | | front | | series |
| Elwell-Parker | IB-ID | | | | | solid | 15x3½ | 15x3½ | amid-u | lead* | 17* | 12* | | 192* | | | front | | |
| Elwell-Parker | F-M | | | | | solid | 21x3½ | 10½*x3 | front-u | lead* | 15* | 12* | | 196* | | | front | | |
| Elwell-Parker | F-1 | | | | | solid | 21*x3½ | 10½*x5 | u-bond* | lead* | 15* | 24* | | 292* | | | front | | series |
| Elwell-Parker | | | | | | solid | 21x3½ | 10½x5 | front-u | lead* | 15* | 12 | | 196* | | | front | | series |
| Elwell-Parker | E | | | | | solid | 21x3½ | 10½x5 | u-bond | lead* | 15* | 12* | 1* | 196* | | | front | | |
| G.V. | | 2,000 | | | 42† | solid | 20x2† | 20x2† | amid-u | Philadelphia WTX* | 21* | 12* | 1* | 69* | | 30*† | rear-3 | G.E. | series |
| Hunt | | 4,000 | | | 58 | solid | 21x3½ | 21x3½ | amid-u | Exide* | | | | | 25 | | rear-1 | Diehl | series |
| Hunt | | 4,000 | | | 42 | solid | 21x4½ | 21x3½ | amid-o | Exide* | | | | | 25 | | rear-1 | Diehl | series |
| Hunt | | 2,000 | | | 60 | solid | 21x3½ | 21x3½ | amid-u | Exide-Ir-MV | 11 | 20 | 2 | 160 | 25 | | rear-1 | Diehl | series |
| Mercury | Z | | | 980 | 40† | solid | 15x3½ | 20x3½ | u-bond | | | | | | | | unit-s-1 | Westinghouse | |
| Mercury | U | | 2,950 | 1,550 | 60 | solid | 22x3½ | 27x4½ | u-bond | | | | | | | | front-1 | Westinghouse | |

**ABBREVIATIONS: General,** *, *with other options; opt, optional.* **Tires, Kind,** cush, *cushion;* s & st, *solid in front and steel in rear.* **Tire Sizes;** d, *dual.* **Battery, Location,** amid-u, *amidships, underframe below frame;* amid-o, *amidships over frame;* rear-u, *at rear, over frame;* rear-o, *at rear, under frame and also under a hood forward;* u-bond, *under hood;* front-u, *in front, under frame;* u-seat, *under seat;* ends-o, *at both ends, over frame.* **Battery, Make and Type,** Exide-Ir, *Exide-Ironclad type.* **Miles per Charge, Loaded,** †, *half way light, half loaded.* **Motor, Location and Number,** amid, *amidships;* unit j, *unit with jackshaft;* unit-s, *unit with axle.* Numbers following *refer to number of motors in chassis.*

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slowly, as in maneuvering and driving in traffic. The controller therefore introduces resistance into the circuit in all but the highest speed, when it transmits the current direct. The locations are various and obviously arranged for convenience in the control lever connections and protection from harm.

### Gearing, First Reduction

As a smaller, lighter motor can be used if it is operated at high speeds, to give the same power, high-speed motors have become the rule in electrical vehicle practice. The use of these motors requires a considerable reduction on the final drive to the road wheels, however, especially on the heavier models, and for this reason, the drive is usually divided into two parts with a primary and secondary reduction.

The first reduction is by **herringbone** gears, a form of cylindrical gear in which the teeth are V-shaped, and possess the advantage of silence and of having more than one tooth in mesh at a time; by **bevel** gears, direct to the jackshaft, like on a chain-driven gasoline vehicle, by **roller** or **silent chain**, or by direct **spur** gearing. The word **none**, appearing in this column of the specification table means that there is no primary reduction, but that the final reduction is the only one.

### Gearing, Second Reduction

The forms of gearing used in the first reduction are also used in the second reduction, with **worm** gearing, **double chains**, and **spiral bevels** in addition.

### Torque Taken By

Torque, in a live axle, is the tendency for it to turn backward bodily instead of remaining stationary while the wheels turn forward. For this reason some means must be arranged to keep it from turning. For this purpose **torque arms**, or arms attached at two point vertically to the axle housing and at one point to the frame of the vehicle; **torsion tubes**, or tubes attached rigidly to the axle and surrounding the driving shaft and also attached by a yoke or other means to the frame; **radius rods**, which, when two in number superimposed, each attached to the axle and frame at different points, act both as torque stays and propulsive members; and the vehicle **springs**, which in this case are firmly anchored to the axle and shackled at one end only. They are also usually specially designed to withstand this additional duty.

### Total Gear-ratio

By total gear-ratio is meant the total reduction through all gears from the armature shaft of the motor to the road or driving wheels. Thus, if the motor must turn 10½ times in order to turn the driving wheels one complete revolution, the total gear-ratio is 10.50 to 1.

### Propulsion Taken By

Propulsion is the pushing or pulling action of the driving axle. Without some restraining means the axle would merely move forward under the chassis and tear itself loose instead of moving the vehicle. To fulfill this function **radius rods**, a securely-anchored **torque arm**, a **torsion tube**, or the vehicle **springs** are used.

On some makes of industrial trucks which are not provided with springs, the axles are rigidly attached to the frame, and hence no such additional stays are needed.

### Control, Steer and Controller Lever

Electric vehicles are steered by **wheels** or by **levers**, located at the **left**, in the **center** or at the **right**. Controller levers are placed on the steering column, **above the wheel** or **below the wheel**, at the **left**, at the **right**, in the **center**, at the **left of the seat**, at the **right of the seat** or **between the seats**.

# ric and Electric Industrial Motor Vehicles

| MOTOR | | | | CONTROLLER | | SPEED | | GEARING | | DRIVE | | | SPRINGS | | CONTROL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Voltage | SPEED IN MILES PER HOUR Light | SPEED IN MILES PER HOUR Loaded | Location | | F'w'd | Rear | First Reduction | Final Reduction | Total Gear Ratio | Torque Taken By | Propulsion Taken By | Front | Rear | Steer | Controller Lever | Name and Model | |
| | 80 | | 10 | u-floor | 4 | 2 | none | sp-bev | | 6 10-1 | springs | springs | 1-ell | 1-ell | wheel-l | u-wheel | Ward | V S |
| | 80 | | 10 | u-seat | 4 | 2 | s-chain | dbl-chn | | | | rad-rd | 1-ell | 1-ell | wheel-l | left | Ward | L-J |
| | 80 | | 8½ | u-seat | 4 | 2 | s-chain | dbl-chn | | | | rad-rd | 1-ell | 1-ell | wheel-l | left | Ward | EA |
| | 80 | | 7 | u-seat | 4 | 2 | s-chain | dbl-chn | | | | rad-rd | 1-ell | 1-ell | wheel-l | left | Ward | Ed |
| | 80 | | 6 | u-seat | 4 | 2 | s-chain | dbl-chn | | | | rad-rd | 1-ell | 1-ell | wheel-l | left | Ward | EC |
| | 80 | | 5 | u-seat | 4 | 2 | s-chain | dbl-chn | | | | rad-rd | 1-ell | 1-ell | wheel-l | left | Ward | E-D |
| 3½ | 85 | | 14 | u-seat | 4 | 4 | s-chain | herring | | | springs | springs | ellip | ellip | wheel-l | left | Waverley | 81 |
| | 85 | | 11 | u-seat | 4 | 4 | bevel | dbl-chn | | | | rad-rd | 1-ell | 1-ell | wheel-l | left | Waverley | |
| | 85 | | 9 | u-seat | 4 | 4 | bevel | dbl-chn | | | | rad-rd | 1-ell | 1-ell | wheel-l | left | Waverley | |
| | 85 | | 8 | u-seat | 4 | 4 | bevel | dbl-chn | | | | rad-rd | 1-ell | 1-ell | wheel-l | left | Waverley | |
| | 85 | | 7 | u-seat | 4 | 4 | bevel | dbl-chn | | | | rad-rd | 1-ell | 1-ell | wheel-l | left | Waverley | |

## Industrial Trucks

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 24 | 7 | 4½ | u-floor | 3 | 3 | spur-gear | top worm | | frame | frame | coil | coil | lever-r | left | Buda | A |
| 3 | 24 | 7 | 4½ | | 3 | 3 | s-chain | top worm | | frame | frame | coil | coil | lever-r | left | Buda | C |
| 3 | 24 | 7 | 4½ | | 3 | 3 | spur-gear | top worm | | | | coil | coil | lever-r | left | Buda | B |
| 3 | 24 | 7 | 4½ | | 3 | 3 | spur-gear | top worm | | | rad-rd | coil | coil | wheel-r | cent | Buda | B-1 |
| 3 | 24 | 7 | 4½ | | 3 | 3 | s-chain | top worm | | sub f | rad-rd | coil | coil | lever-r | left | Buda | CE |
| 3½ | 50 | 6 | 4½ | u-floor | 4 | 4 | worm | bevel 4 | 16 40-1 | sub-f | sub-f | coil | coil | wheel-r | left | Dynamic | A |
| 3½ | 50 | 6 | 4½ | u-floor | 4 | 4 | worm | bevel-4 | 16 40-1 | sub-f | sub-f | coil | coil | wheel-r | left | Dynamic | B |
| 3½ | 50 | 6 | 4½ | u-floor | 4 | 4 | worm | bevel-4 | 16 40-1 | sub-f | sub-f | coil | coil | wheel-r | u-wheel | Dynamic Tractor | BC |
| | | | 5 | u-floor | 4 | 4 | s-chain | dbl-chn | | | rad-rd | coil | coil | lever-r | left | Electromobile | A |
| | | | 7 | u-floor | 4 | 4 | s-chain | dbl-chn | | | rad-rd | coil | coil | lever-r | left | Electromobile | D |
| | | | 7 | u-floor | 4 | 4 | s-chain | dbl-chn | | | rad-rd | coil | coil | lever-r | left | Electromobile | B |
| | | | 5 | u-floor | 4 | 4 | s-chain | dbl-chn | | | rad-rd | coil | coil | lever-r | left | Electromobile | C |
| | | | 7 | u-floor | 4 | 4 | s-chain | dbl-chn | | | rad-rd | coil | coil | lever-r | left | Electromobile Tractor | E |
| | 24 | | | in dash | 3 | 3 | none* | top worm-f* | | | | | | lever-r | left | Elwell-Parker | SA-SC-SE |
| | 24 | | | in dash | 3 | 3 | none* | top worm-f* | | | | | | lever-r | left | Elwell-Parker | DD-EC |
| | 24 | | | in dash | 3 | 3 | none* | top worm | | | | | | lever-r | left | Elwell-Parker | IB-ID |
| | 24 | | | | 3 | 3 | spur-gear | spur-gear-f | | | | | | lever-r | left | Elwell-Parker | F-W |
| | 24 | | | in dash | 3 | 3 | none* | top worm* | | | | | | lever-r | left | Elwell-Parker | F-I |
| | 24 | | | | 3 | 3 | spur-gear | spur-gear-f | | | | | | lever-r | left | Elwell-Parker | |
| | 24 | | | in dash | 3 | 3 | spur-gear | spur-gear-f | | | | | | lever-r | left | Elwell-Parker | E |
| 11 | 24 | 10 | 7 | u-hood | 3 | 3 | none | spur-gear | 8 85-1 | tor-arm | | coil | coil | lever-r | left | G.V. | |
| 2½ | 35 | 7 | 4 | u-seat | 3 | 3 | bevel | bevel | | | | | | lever-r | left | Hunt | |
| 3 | 60 | 7 | 4 | u-seat | 3 | 3 | bevel | bevel | | | | | | wheel-r | left | Hunt | |
| 2 | 35 | 4 | 5 | | 3 | 3 | bevel | bevel | | | | | | lever-r | left | Hunt | |
| | 24 | | 6 | u-seat | 3 | 2 | | top worm | 17 00-1 | | | none | none | lever-l | right | Mercury | Z |
| | 60 | 5 | 5 | u-seat | 3 | 3 | | top worm | | tor-arm | rad-rd | trans-x | 1-ell | wheel-l | btw seats | Mercury | U |

BREVIATIONS: (continued). **Controller, Location**, u-seat, *under seat*; u-floor, *under floor of cab*; u-hood, *under hood*; btw seats, *between seats*. **Drive, Gearing, First Reduction**, s-chain, *silent chain*. **Reduction**, dbl-chn, *double chain*; sp bev, *spiral bevel gears*; herring, *herringbone gears*; f, *to front wheels*; 4, *to all four wheels*. **Torque Taken By**, tor-arm, *torque arm*; tor-t, *torsion tube*; sub-f, *sub-frame*. **pulsion Taken By**, rad-rd, *radius rods*; sub-f, *sub-frame*. **Springs**, ellip, *elliptic*; 1-ell, *half-elliptic*; 2-ell, *three-quarters-elliptic*; trans-x, *transverse X-shape or reversed elliptic*. **Control, Steer**, l, *to the left, r, to the right*; c, *in the center*. **Controller Lever**, u-wheel, *under steering wheel*; l-wheel, *on top of steering wheel*; l-seat, *to left of seat*; btw seats, *between seats*; cent, *center*.

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# Buyers' Guide to 1916 Electric Trucks

Salient Features of Chassis, Classified According to Capacity

## TRUCKS UNDER ½-TON CAPACITY

| Name and Model | Capacity in Lbs. | Chassis Price: With Battery | Chassis Price: Without Battery | Wh'l-base | Battery Location | Motor Location and Number | Final Drive |
|---|---|---|---|---|---|---|---|
| Connorsville | 750 | $750 | $600 | 80 | rear-unh. | ..... | herring |
| Lansden S | 750 | 1,850 | 1,175 | 90 | u-seat | unit-s-1 | bevel |
| Ward WS | 750 | ..... | ..... | 88 | u-seat | amid-1 | sp bev |

## TRUCKS OF ½-TON CAPACITY

| Name and Model | Capacity in Lbs. | With Battery | Without Battery | Wh'l-base | Battery Location | Motor Location and Number | Final Drive |
|---|---|---|---|---|---|---|---|
| Baker X | 1,000 | 1,900 | ..... | 86 | amid-u | rear-1 | dbl chn |
| C.T. | 1,000 | ..... | 1,640 | 90* | amid-u | unit-s-2 | spur gear |
| G.M.C. I | 1,000 | 1,850 | 1,200 | 106* | amid-o | rear-1 | dbl chn |
| G.V. | 1,000 | ..... | 885 | amid-o | rear-1 | dbl chn |
| G.V. | 1,000 | ..... | 1071 | u-hood | amid-1 | top worm |
| Lansden M | 1,000 | 2,310 | 1,600 | 90 | amid-u | unit-j-1 | dbl chn |
| Walker M | 1,000 | ..... | ..... | 90* | amid-u | unit-s-1 | spur gear |
| Ward EO | 1,000 | ..... | ..... | 90 | amid-u | amid-1 | dbl chn |
| Waverley S1 | 1,000 | 1,800 | 1,575 | 90 | amid-u | rear-1 | herring |

## TRUCKS OF 1-TON CAPACITY

| Name and Model | Capacity in Lbs. | With Battery | Without Battery | Wh'l-base | Battery Location | Motor Location and Number | Final Drive |
|---|---|---|---|---|---|---|---|
| Baker O | 2,000 | 2,300 | ..... | 102 | amid-u | rear-1 | dbl chn |
| C.T. | 2,000 | ..... | 2,095 | 100* | amid-u | unit-s-2 | spur gear |
| G.M.C. Z | 2,000 | 1,740 | 1,300 | 118* | amid-o | rear-1 | dbl chn |
| G.V. | 2,000 | ..... | ..... | 103 | amid-u | rear-1 | dbl chn |
| Lansden M | 2,000 | 2,900 | 1,700 | 106 | amid-u | unit-j-1 | dbl chn |
| Walker K | 2,000 | ..... | ..... | 92* | amid-u | unit-s-1 | spur gear |
| Ward EA | 2,000 | ..... | ..... | 99 | amid-u | amid-1 | dbl chn |
| Waverley | 2,000 | 2,150 | ..... | 104 | amid-u | rear-1 | dbl chn |

## TRUCKS OF 1½-TON CAPACITY

| Name and Model | Capacity in Lbs. | With Battery | Without Battery | Wh'l-base | Battery Location | Motor Location and Number | Final Drive |
|---|---|---|---|---|---|---|---|
| G.M.C J | 3,000 | 1,940 | 1,450 | 130* | amid-o | rear-1 | dbl chn |

## TRUCKS OF 2-TON CAPACITY

| Name and Model | Capacity in Lbs. | With Battery | Without Battery | Wh'l-base | Battery Location | Motor Location and Number | Final Drive |
|---|---|---|---|---|---|---|---|
| Baker U | 4,000 | 2,800 | ..... | 120 | amid-u | rear-1 | dbl chn |
| C.T. | 4,000 | ..... | 2,725 | 116 | amid-u | unit-s-2 | spur gear |
| G.M.C 4 | 4,000 | 2,200 | 1,650 | 138* | amid-o | rear-1 | dbl chn |
| G.V. | 4,000 | ..... | ..... | 111 | amid-u | rear-1 | dbl chn |
| Lansden M | 4,000 | 3,660 | 2,100 | 120 | amid-u | unit-j-1 | dbl chn |
| Walker L | 4,000 | ..... | ..... | 107* | amid-u | unit-s-1 | spur gear |
| Ward EB | 4,000 | ..... | ..... | 111 | amid-u | amid-1 | dbl chn |
| Waverley | 4,000 | 3,000 | ..... | 114 | amid-u | rear-1 | dbl chn |

## TRUCKS OF 3-TON CAPACITY

| Name and Model | Capacity in Lbs. | With Battery | Without Battery | Wh'l-base | Battery Location | Motor Location and Number | Final Drive |
|---|---|---|---|---|---|---|---|
| Walker D | 6,000 | ..... | ..... | 126* | amid-u | unit-s-1 | spur gear |

## TRUCKS OF 3½-TON CAPACITY

| Name and Model | Capacity in Lbs. | With Battery | Without Battery | Wh'l-base | Battery Location | Motor Location and Number | Final Drive |
|---|---|---|---|---|---|---|---|
| Baker CC | 7,000 | 3,500 | ..... | 137 | amid-u | rear-1 | dbl chn |
| Couple-Gear H | 7,000 | 4,200 | 3,600 | 96 | amid-u | in wheel-1 | bevel-4 |
| C.T. | 7,000 | ..... | 3,530 | 115* | amid-u | unit-s-4 | spur gear-4 |
| G.M.C 7 | 7,000 | 2,660 | 2,000 | 150* | amid-o | rear-1 | dbl chn |
| G.V. | 7,000 | ..... | ..... | 184 | amid-u | rear-1 | dbl chn |
| Lansden M | 7,000 | 4,455 | 2,475 | 130 | amid-u | unit-j-1 | dbl chn |
| Ward EC | 7,000 | ..... | ..... | 132 | amid-u | amid-1 | dbl chn |
| Waverley | 7,000 | 3,400 | ..... | 127 | amid-u | rear-1 | dbl chn |

## TRUCKS OF 4-TON CAPACITY

| Name and Model | Capacity in Lbs. | With Battery | Without Battery | Wh'l-base | Battery Location | Motor Location and Number | Final Drive |
|---|---|---|---|---|---|---|---|
| Walker E | 8,000 | ..... | ..... | 130* | amid-u | unit-s-1 | spur gear |

## TRUCKS OF 5-TON CAPACITY

| Name and Model | Capacity in Lbs. | With Battery | Without Battery | Wh'l-base | Battery Location | Motor Location and Number | Final Drive |
|---|---|---|---|---|---|---|---|
| Baker EA | 10,000 | 3,850 | ..... | 137 | amid-u | rear-1 | dbl chn |
| Couple-Gear A | 10,000 | 4,800 | 4,100 | 98 | amid-u | in-wheel-4 | bevel 4 |
| C.T. | 10,000 | ..... | 3,935 | 132* | amid-u | unit-s-4 | spur-gear-4 |
| G.M.C. 10 | 10,000 | 3,060 | 2,350 | 166* | amid-o | rear-1 | dbl chn |
| G.V. | 10,000 | ..... | ..... | 139 | amid-u | rear-1 | dbl chn |
| Lansden M | 10,000 | 5,190 | 2,850 | 142 | ..... | unit-j-1 | dbl chn |
| Walker N | 10,000 | ..... | ..... | 130* | amid-u | unit-s-1 | spur gear |
| Ward ED | 10,000 | ..... | ..... | 159 | amid-u | amid-1 | dbl chn |
| Waverley | 10,000 | 3,950 | ..... | 136 | amid-u | rear-1 | dbl chn |

## TRUCKS OF 6-TON CAPACITY

| Name and Model | Capacity in Lbs. | With Battery | Without Battery | Wh'l-base | Battery Location | Motor Location and Number | Final Drive |
|---|---|---|---|---|---|---|---|
| Couple-Gear AF | 12,000 | 3,800 | 3,200 | 110* | amid-u | in wheel-2 | bevel-f |
| G.M.C 12 | 12,000 | 3,720 | 2,500 | 174* | amid-o | rear-1 | dbl chn |

## TRACTORS

| Name and Model | Capacity in Lbs. | With Battery | Without Battery | Wh'l-base | Battery Location | Motor Location and Number | Final Drive |
|---|---|---|---|---|---|---|---|
| Couple-Gear HF1 | 4,000 | 2,250 | 1,650 | 80 | amid-u | in-wheel-1 | bevel-f |
| Lansden | 20,000 | 3,660 | 2,100 | 58 | amid-o | rear-1 | dbl chn |
| Walker DK | 20,000 | ..... | ..... | 74* | rear-o | unit-s-1 | spur gear |

## ELECTRIC INDUSTRIAL TRUCKS

| Name and Model | Capacity in Lbs. | With Battery | Without Battery | Wh'l-base | Battery Location | Motor Location and Number | Final Drive |
|---|---|---|---|---|---|---|---|
| G.V. | 2,000 | ..... | ..... | 42½ | amid-u | rear-2 | spur gear |
| Electromobile A | 3,000 | ..... | ..... | 43* | amid-u | unit-j-1 | dbl chn |
| Electromobile B | 3,000 | ..... | ..... | 53* | amid-u | unit-j-1 | dbl chn |
| Hunt | 3,000 | ..... | ..... | 60 | amid-u | rear-1 | bevel |
| Buda A | ..... | ..... | ..... | 44 | amid-u | unit-s-1 | top worm |
| Buda C | ..... | ..... | ..... | 52 | rear-o | unit-s-1 | top worm |
| Buda B | 4,000 | ..... | ..... | 40 | rear-o | front-1 | top worm |
| Buda B-1 | ..... | ..... | ..... | 36 | end-o | unit-s-1 | top worm |
| Buda CE | 4,000 | ..... | ..... | 52 | rear-o | front-1 | top worm |
| Dynamic A | 4,000 | ..... | ..... | 60 | amid-u | amid-1 | bevel-4 |
| Dynamic B | 4,000 | ..... | ..... | 60 | amid-u | amid-1 | bevel-4 |
| Electromobile D | 4,000 | ..... | ..... | 60¶ | amid-u | unit-j-1 | dbl chn |
| Electromobile C | 4,000 | ..... | ..... | 52* | amid-u | unit-j-1 | dbl chn |
| Elwell-Parker SA-SC-SE | ..... | ..... | ..... | ..... | front-u | front | top worm-f* |
| Elwell-Parker DD-DG | ..... | ..... | ..... | ..... | front-u | front | top worm-f* |
| Elwell-Parker IB-ID | ..... | ..... | ..... | ..... | amid-u | front | top worm‖ |
| Elwell-Parker F-W | ..... | ..... | ..... | ..... | front-u | front | spur-gear† |
| Elwell-Parker F-1 | ..... | ..... | ..... | ..... | u-hood* | front | top worm‖ |
| Elwell-Parker | ..... | ..... | ..... | ..... | front-u | front | spur gear-f‖ |
| Elwell-Parker E | ..... | ..... | ..... | ..... | u-hood | front | spur gear-f |
| Hunt | 4,000 | ..... | ..... | 58 | amid-u | rear-1 | bevel |
| Hunt | 4,000 | ..... | ..... | 42 | amid-u | rear-1 | bevel |
| Mercury Z | ..... | 980 | ..... | 46¶ | u-hood | unit-s-1 | top worm |
| Mercury U | 2,950 | 1,550 | ..... | 60 | u-hood | front-1 | top worm |
| Dynamic Tractor K | 20,000 | ..... | ..... | 60 | end-o | amid-1 | bevel-4 |
| Electromobile Tractor E | ..... | ..... | ..... | 36 | amid-o | unit-j-1 | dbl chn |

ABBREVIATIONS: General, *, with other options. Battery Location, amid-u, amidships, underslung below frame; amid-o, amidships over frame; rear-u, at rear, over frame; rear-unh, at rear under frame and also under a hood forward, u-hood, under hood; front-u, in front, under frame; u-seat, under seat, end-o, at both ends over frame. Motor, Location and Number, amid, amidships; unit-s, unit with packaging; unit-j, unit with axle. Numbers following refer to number of motors in chassis. Final Drive, dbl chn, double chain, sp-bev, spiral bevel gears, herring, herringbone gears; -f, to front wheels; -4, to all four wheels.

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# Glossary of Industrial Truck Phraseology

BESIDES the technical specifications published in the electric industrial tabulations on pages 42 and 43, below are additional details regarding the measurements and characteristics of these vehicles as distinct from the electric street trucks.

**Types**

There are eight types of electric industrial trucks: The **baggage-platform** type which has large wheels and a flat platform, so as to make it nearly or quite car-door height. These trucks are the largest of all. The **baggage drop-platform** type is similar to the above except that the middle portion of the platform is dropped to as near the floor as practicable. The **warehouse-platform** type has a flat platform and somewhat lower wheels than the baggage types, so that the platform is a convenient lifting height. The **warehouse drop-platform** type has a very low platform with a pair of small wheels under one end and medium-sized ones at the other. The **freight car low-platform** type is similar to the warehouse drop-platform type except that it is shorter, sometimes narrower, its platform is, if anything, lower, and the wheels a little smaller, so that it can run into and out of a freight car. **Tractors** are designed to draw trailers, sometimes carrying loads themselves. **Transfer** trucks have elevating platforms and are similar in design to freight car trucks, their loads being carried on interchangeable false platforms which may be picked up or dropped by the elevating device. **Coal dump** trucks are usually warehouse-platform types with dumping coal or ash bodies.

**Driver's Position**

Drivers of electric industrial trucks usually stand on folding platforms at one or both ends, but on some of the tractors they have seats in the center, at the front or on both ends.

**Brake Control**

Brakes are usually controlled by **pedals**, which when pressed release the brake, but when released apply the brake by means of a spring. Other types require pressure on the pedal to actuate the brake, others still have the whole **platform** a brake pedal, applied by a spring when the driver dismounts. On some tractors a secondary brake control is provided by means of a **lever** or a **seat** which when occupied holds the brake off, but permits a spring to apply it when the driver rises.

**Cut-out Control**

The cut-out is the master switch. When operated it breaks the circuit and usually remains out until the controller handle is returned to neutral position. Some of these are interconnected with the **brake**, operating with the application of the brake; others are worked by a separate **pedal** or **lever**.

# Details of Electric Stevedore Construction

## Data Additional to Specifications of Electric Industrial Vehicles

| Name and Model | | Type | TRACK IN INCHES | | Turning Circle in Feet | LOAD PLATFORM SIZE IN INCHES | | | Overall Length in Inches | Maximum Grade Negotiable in per Cent | Driver's Position | Brake Control | Cut-out Control | Number of Wheels |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Front | Rear | | Length | Width | Height from Ground | | | | | | |
| Buda | A | warehouse-platform | 31½ | 33 | 14 | 54 | 40 | 21 | 96 | ..... | plat-f | pedal | brake | 4 |
| Buda | C | freight car-low plat. | 31 | 34 | 12 | 60 | 40† | 10½ | 96 | ..... | plat-f | pedal | brake | 4 |
| Buda | B | tractor | 31½ | 34 | 16 | 39 | 40½ | 20½ | 74 | ..... | plat-f | pedal | brake | 4 |
| Buda | B1 | tractor | 31½ | 34 | 10 | ..... | 40½ | 21 | 72 | ..... | seats-ends | pedal | brake | 4 |
| Buda | CE | transfer | 31 | 34 | 12 | 60 | 40½ | 11 | 96 | ..... | plat-f | pedal | brake | 4 |
| Dynamic | A | warehouse-platform | 36 | 36 | ..... | 54 | 45 | 34 | 102 | 15 | plat-f | plat | brake | 4 |
| Dynamic | B | warehouse-platform | 27 | 27 | ..... | 76 | 36 | 24 | 94 | 15 | plat-f | plat | brake | 4 |
| Dynamic | BC | tractor | 27 | 27 | 12 | 76 | 36 | 24 | 76 | 15 | seats-ends | pedal | brake | 4 |
| Electromobile | A | warehouse-platform | 34 | 34 | 14 | 64 | 41 | 22½* | 84 | 30 | plat-f | pedal | brake | 4 |
| Electromobile | D | warehouse-platform | 34 | 34 | 19½ | 90* | 41 | 22½* | 102* | 30 | plat-f | pedal | brake | 4 |
| Electromobile | B | warehouse-platform | 34 | 34 | 17 | 81 | 41 | 22½* | 93 | 30 | plat-f | pedal | brake | 4 |
| Electromobile | C | warehouse-platform | 34 | 34 | 17 | 81 | 41 | 22½* | 93 | 30 | plat-f | pedal | brake | 4 |
| Electromobile | E | tractor | 34 | 34 | 9½ | none | none | 22½ | 72 | 30 | plat-f | pedal | brake | 4 |
| Ewell-Parker | SA | baggage-platform | 39½ | 39½ | 24 | 137 | 43½ | 33 | 149 | ..... | plat-ends | pedal | pedal | 4 |
| Ewell-Parker | SC | baggage-platform | 33½ | 33½ | 20 | 108 | 37½ | 33 | 120 | ..... | plat-ends | pedal | pedal | 4 |
| Ewell-Parker | SE | baggage-platform | 39½ | 39½ | 24 | 136 | 43½ | 33 | 150 | ..... | plat-ends | pedal | pedal | 4 |
| Ewell-Parker | DD | baggage-drop-plat | 39½ | 39½ | 24 | 137 | 43½ | 11 | 149 | ..... | plat-ends | pedal | pedal | 4 |
| Ewell-Parker | DG | baggage-drop-plat | 39½ | 39½ | 24 | 137 | 43½ | 11 | 151 | ..... | plat-ends | pedal | pedal | 4 |
| Ewell-Parker | 1B | warehouse-platform | 25 | 25 | 12 | 72 | 37 | 18 | 93 | ..... | plat-f | pedal | pedal | 4 |
| Ewell-Parker | 1S | warehouse-platform | 25 | 25 | 12 | 76 | 46 | 18 | 84 | ..... | plat-f | pedal | pedal | 4 |
| Ewell-Parker | 1D | warehouse-platform | 28 | 25 | 15 | 88 | 37 | 18 | 97 | ..... | plat-f | pedal | pedal | 4 |
| Ewell-Parker | F | warehouse-drop-plat | 33½ | 26 | 14 | 57 | 44 | 11 | 85 | ..... | plat-f | pedal | pedal | 4 |
| Ewell-Parker | W | warehouse-drop-plat | 33½ | 26 | 20 | 94 | 37 | 17 | 112 | ..... | plat-f | pedal | pedal | 4 |
| Ewell-Parker | F | tractor | 33½ | 26 | 14 | none | none | none | 85 | ..... | plat-f | pedal | pedal | 4 |
| Ewell-Parker | I | tractor | 25 | 25 | 11 | none | none | none | 74 | ..... | seat-f | pedal | pedal | 4 |
| Ewell-Parker | EB | freight car-low plat | 33½ | 26 | 14 | 57 | 44 | 11 | 85 | ..... | plat-f | pedal | pedal | 4 |
| Ewell-Parker | EC | freight car-low plat | 33½ | 26 | 14 | ..... | ..... | ..... | 85 | ..... | plat-f | pedal | pedal | 4 |
| Ewell-Parker | E | transfer | 33½ | 26 | 14 | 50 | 44 | 11 | 85 | ..... | plat-f | pedal | pedal | 4 |
| Ewell-Parker | | transfer | 33½ | 26 | 14 | 60 | 37 | 17 | 93 | ..... | plat-f | pedal | pedal | 4 |
| Ewell-Parker | | transfer | 33½ | 16 | 14 | 60 | 26 | 11 | 91 | ..... | plat-f | pedal | pedal | 4 |
| G.V. | | warehouse-platform | 35 | 35 | 15 | 69 | 43½ | 22 | 90 | ..... | plat-r | pedal | brake | 4 |
| Hunt | | warehouse-platform | 60 | 40 | 14 | 90 | 48 | 22 | 108 | 17½ | plat-f | pedal | plat | 4 |
| Hunt | | tractor | 60 | 40 | 6 | ..... | 48 | ..... | 78 | 17½ | seat-f | pedal | seat | 4 |
| Hunt | | coal dump | 60 | 40 | 16 | 90 | 36 | 24 | 120 | 15 | plat-f | pedal | plat | 4 |
| Mercury | Z | tractor | ..... | 30 | ..... | none | none | none | 71 | ..... | seat-f | pedal† | brake | 3 |
| Mercury | U | tractor | ..... | 47 | ..... | none | none | none | 96 | ..... | seat-f | pedal† | lever | 4 |

ABBREVIATION S: General, *, with other options. Type, drop-plat, dropped-platform; low plat, low platform. Driver's Position, plat-r, platform at rear; plat-f, platform at front; plat-ends, platform at both ends; seats-ends, seats at both ends; seat-f, seat in front. Brake Control, plat, hinged platform; †, secondary brake control by lever or hinged seat. Cut-out Control, plat, by hinged platform.

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# Truck Is Baker's Best Boost

## Efficiency of Whole Business Increased by Motor Delivery

By G. D. Crain, Jr.

Front view of Wagner Bakery truck, showing sliding doors behind driver's seat open and exposing shelves

WHEN the Wagner Bakery, of Louisville, Ky., bought its ¾-ton White delivery truck in September, 1912, the funds in the treasury were not abundant enough to enable the company to pay cash for the new vehicle, which cost $3,000. So the management, in order to raise $500 cash, sold two horses and two wagons and then added about $150 in cash, giving notes for the remainder of the bill, which the White company's dealer discounted at the Louisville banks. These were made out so that one should fall due monthly, and the company met them until the last one was cleared up, by setting aside what would have been paid out for horse feed, wagon maintenance and drivers' salaries, the latter items in both cases being $15 weekly.

### Little Trouble to { Buy / Own

In other words, the Wagner Bakery, 434 Baxter avenue, Louisville, acquired a truck, which has been in constant service ever since, with perhaps a total interruption of one week for a new magneto and certain other minor repairs, without feeling it. Now, after almost 3 years of strenuous service, the truck is doing the same work it did at the very outset, having displaced four horses and three wagons, as well as three drivers, the truck being driven by members of the company, who are recompensed for their extra work by increased dividends on their stock. The drivers used to draw $15 flat, with commissions; now the money goes into the till.

So thorough has been the satisfaction of the company with the performance of this truck that it has practically reached a decision to invest in a second truck, a lighter one, which will replace the remaining two wagons and at the same time enable the company to extend its market miles into the surrounding country, which is difficult to negotiate now with the heavy truck and small wagons.

### Large Reserve Capacity

At that the company feels that the White truck could do practically three times the work it is doing, since its busiest time is from 1 a. m. to 6. p. m., when deliveries of freshly-baked bread are being made to the retailers. But it is felt, without detailed figures to substantiate the statement and in connection with the manner in which the bill for the truck was met, that it has paid for itself already and the management sees no reason why there are not many years of service still left in the vehicle.

In recounting what the truck has done for the Wagner Bakery, Fred Wagner, general manager of the plant, summed up its performances somewhat as follows:

### The Brief for the Truck

Replaced four horses, three wagons and three drivers.

Extended the market of the company through low cost of delivery service, to all sections of the city from which it is possible to take orders.

Actually increased the storage capacity of the bakery, so that it is possible to concentrate baking operations within a minimum time, without having to provide for additional storage room.

In that way shortened the hours of work, reduced the fuel bills by enabling the heat peak period, as it is termed, to be minimized, and relieved the two members of the company of sufficient lengths of duty at the bakery to get out among the customers.

Attracts so much attention on the

The truck which has built up a business for a Louisville baker, showing drawers under floor for sweet goods, tools and supplies

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streets which it traverses, from bread consumers and from bread retailers, that the company has not found it necessary to spend a cent in newspaper advertising since the truck went into service, this advertising having previously been considerable.

By its excellent appearance—especially before the newness wore off it—gives the Wagner Bakery, which is neither large nor elaborate, a prestige which otherwise it could not have attained.

Served as a vehicle for weekly collections from the retailers, collections of empty bread baskets and cash, this bakery selling on the no-returns basis, and in that service showing up on the streets in the day time, when it did its good publicity work to a large extent.

Relieved the company of costs for drayage of supplies which had been running to $40, $45, $50 and even $60 a month, the truck bringing everything the bakery uses except the coal and coke which does not constitute more than 10 per cent of the total volume.

Helped the company to tide over the last lean winter, in the face of high-priced flour, wobbly collections and competition that has proved ruinous to more than a few Louisville bakers.

### Using the By-products

Probably the record of accomplishment, in the view of Mr. Wagner, could be prolonged, but this is sufficient to show that here is a truck that is proving itself and, incidentally, that it is owned by a concern with an enterprising and ingenious general manager, who has devised many new and profitable ways to make his truck serve him.

It is equipped with the type of body built by the White Co. especially for bakery use. There are more than a few of them in the country, some of the larger big city bakeries having fleets of them. It is the usual 1,500-pound capacity, with a body 5 feet wide, 7 feet from floor to roof and about 8 feet long. It was equipped with pneumatic tires all around at the outset, but after a trial with the heavy hauling, the pneumatic tires on the rear wheels have been replaced with cushion tires and these are giving excellent service. Well proportioned, of good line and painted white throughout, the lettering neatly done, this car was a thing of beauty as well as utility when first put into service.

It has been, with the brief periods referred to, in service constantly, 365 days in the year, and, though no accurate records have been kept, has done at least 15,000 miles a year. On more than one occasion, it has done 100 miles, not allowing for stops, between the hours of 1 a. m. and 6 a. m. having a speed of 35 miles an hour with a full load on.

The bread it carries is handled in two ways, loose and in baskets. Doors that open from the rear and sliding doors behind the driver's seat, give access to the interior, which is provided with a light, fed by the ignition battery, to show the driver what he wants to find in the early morning hours. When the bread is carried loose, it is packed loaf against loaf, set on end, the several layers resting on slatted racks that are slid in on angle irons appropriately spaced and attached to the side walls of the body.

### Bread Enough for an Army

Filled in this manner, the body will carry 3,200 loaves of the 12-ounce bread which this bakery makes, obviously considerable of an overload. When baskets are used each dealer's order is packed separately and the truck is loaded according to the route, baskets being nested when they are not full or carried on the racks, alternate racks removed, when brimming. On such trips the driver takes his bread out from the rear, finding the basket with the last delivery on the route under the seat he occupies.

Waiting for a load, showing arrangement of shelves and space for bread baskets below

### Keeping Up With the Ovens

Maximum capacity of this bakery is about 8,400 loaves during rush hours. Storage space has been provided for only about 5,000 loaves. It used to be that the baking had to be retarded to wait on the wagons, but now with the superior speed and capacity of the truck, it can be rushed through the 5,000 loaves stacked on the inside rack; 3,000 or so in the body of the truck and whatever is left over disposed of in the wagons, one of which at least is usually available. This means that the oven can be brought to sufficient baking heat and crowded to capacity and the daily bake disposed of in the shortest possible time. Without the efficient motor delivery such work would have meant probably an extension of the bakery.

The company uses between 15 and 20 barrels of flour a day. For years a local transfer company had that business, hauling it under contract at 5 cents a barrel and collecting each month anywhere from $20 to $30. Now the truck brings this flour, and regularly carries 15 barrels at a clip, in sacks, while frequently it negotiates 20 barrels at a time, according to the needs of the plant. With flour at 140 pounds to the barrel these loads range from 2,100 to 2,800 pounds.

### A Double Advantage

In addition, all the sugar, all the chocolate, all the various supplies for sweet goods as well as bread are bought f. o. b. warehouse or depot, and the truck goes for them. Not only does it carry these supplies more cheaply than the drayage costs, according to the management's estimate, but these trips keep the truck on the street more.

Here is an incidental advantage the company was not slow to discover and take advantage of. When immaculately, brilliantly white and new, it was a flamboyant vehicle. It dominated, even at a time when the motor truck was no longer a novelty, every other vehicle on the street. Evidently a superior article, it reflected credit on the bakery. That was why Fred Wagner himself drove it around the city to the retail stores to collect bills receivable. The retailers liked to see it in front of their stores; they appreciated the effect a glimpse of it would have on their customers and they received the collector with unwonted cordiality on account of the manner of his arriving. It has made the name Wagner Bakery familiar in Louisville and is given full credit by the company's management for much of the increase in the volume of business that is turned out.

Just in front of the rear wheels, as may be noted in the illustration, are two small drawers. These are to be found on each side, four altogether. They are available, and would readily serve, for carrying what the bakers call "sweet goods," cakes, pies, doughnuts, etc., and

(Continued on page 57)

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# SPECIAL SERVICE

THE FLEET OF WHITE TRUCKS DISPOSED OF ALL THE EXCAVATED MATERIAL, CARRYING IT FROM THE TUNNEL INTERIOR * * * TO THE BORE OPENING

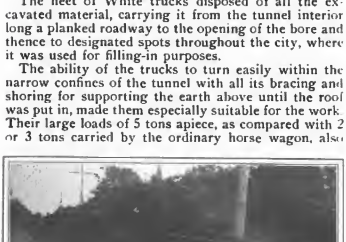
## Trucks Help Build Twin Peaks Tunnel

WORKING day and night, a fleet of 5-ton White dump trucks played an important part in the construction of the huge tunnel bored through San Francisco's Twin Peak mountains. These two eminences, almost of the shame shape and height, stand at the head of Market street in the Golden Gate city and form natural barriers separating the city proper from the comparatively level country just beyond. To open up this territory, which is considered by some to be the most beautiful of San Francisco's environs, it was decided to tunnel through the Twin Peaks.

This gave rise to one of the most interesting engineering problems ever projected on the Pacific coast. The gigantic bore, with arched roof extending 15 feet above a floor 30 feet wide, runs for 2¼ miles through the hills. When completed, the tunnel will be the main artery of travel between the city and the beautiful country lying to the south.

The fleet of White trucks disposed of all the excavated material, carrying it from the tunnel interior long a planked roadway to the opening of the bore and thence to designated spots throughout the city, where it was used for filling-in purposes.

The ability of the trucks to turn easily within the narrow confines of the tunnel with all its bracing and shoring for supporting the earth above until the roof was put in, made them especially suitable for the work. Their large loads of 5 tons apiece, as compared with 2 or 3 tons carried by the ordinary horse wagon, also enabled a greater amount of material to be carted off with less vehicular congestion inside the bore than would have been possible with horse wagons. The short space of time which it takes the trucks to dump their loads at the appointed filling-in points and return to the bore for another load, also had a great deal to do with the selection of trucks instead of horses for the work.



LAST SPRING THE TRUCK HAULED 272 TONS OF ICE OVER THE MOUNTAIN IN 6 WEEKS

## Pittsburgh Dog Catchers Use Truck

KEEPING pace with the greatly-increased use of motor trucks in practically every line of ordinary business endeavor, even the modern dog catcher now finds it necessary to use a truck. The Animal Rescue League of Pittsburgh, Pa., now operates a 2½-ton Lange truck exclusively for the purpose of collecting cats and dogs. The work which this truck does must not be confused with the collection of animals whose owners have sent a request to the league to call to get an ailing cat or dog, for it does nothing but pick up stray animals found wandering on the city streets. The league has divided Pittsburgh into six districts, one of which is patrolled by the truck each day in its work of collecting unlicensed dogs.

The rather unusual work which the truck does has made necessary the use of a novel body and method of operation. The body, of the box type, is divided into thirty-four separate compartments, seventeen on each side, with one solid partition on the center line of the truck between each group. In turn, each group is divided into three horizontal rows of cages, totaling sixteen, with one below the truck frame at the rear. The top row has seven compartments, the middle row five, and the bottom row four, these being of different size to accommodate small or large animals. Each cage has a self-locking screened door at the side.

The floor of each compartment is lined with aluminum, so that it may be cleaned easily. A thorough cleansing of the entire body is made easy by the fact that it can be readily removed from the chassis at stated intervals and washed and sterilized without damage to any of the truck mechanism. The use of separate compartments for each animal minimizes the communication of diseases from one to the other as might be the case were more than one caged in the same compartment. Another advantage is that the vicious animals can not hurt the more timid ones.

A running board is employed from the front wheel

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fender on one side, clear around the rear of the body to the other. In the way of the rear wheels it is stepped up over the fenders to form platforms to reach the middle and top rows of cages on each side.

In operation, one man drives the truck and another stands on the running board at the rear, holding onto two vertical hand-rails provided for the purpose. When patrolling the streets, if the driver spys a stray cat or dog, he stops the truck and the man at the rear jumps off and catches the animal, finally returning and putting it into a cage of its own. If the driver should happen to pass a suspicious looking animal which is seen by the man at the rear, the latter pushes a button operating an electric buzzer, thus signaling the driver to stop.

The truck covers about 50 miles every working day of the year and collects a daily average of fifteen cats and dogs. It has replaced a two-horse wagon and has given much more satisfactory service, according to H. L. Corbet, secretary of the league, who has stated that it would not think of going back to the old way.

### Ice Truck a Mountain Climber

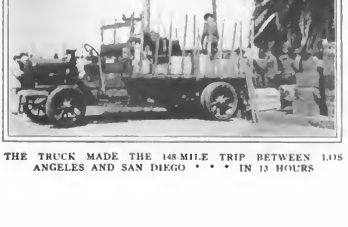
CLIMBING mountains is the daily diet of the 1-ton Little Giant truck shown in an accompanying illustration. It is owned by the East Mountain Ice Co., Scranton, Pa., and makes from two to four trips daily over the steep mountain which is a member of the Alleghany range between Scranton and Dunmore. Anyone with knowledge of the mountain roads in that section of the country will attest that they are bad. The stretch shown in the illustration is a typical one. although it does not show the maximum grade which must be negotiated.

Last spring the truck hauled 272 tons of ice over the mountains in 6 weeks, which is an enviable record considering the extra poor condition of the roads due to the early spring rains and the melting snow.

Although the truck must mount many short grades up out of the valley near Scranton, its greatest test is the run over the mountain ridge which is a continuous climb for about 2½ miles.

### Uncle Sam Uses Trucks on Mexican Border

ALTHOUGH the mule has not yet disappeared from the Commissary Department of the United States Army, he is slowly passing into the discard, as is evidenced by the large number of motor trucks now in use along the Mexican border. These supply with food and ammunition those of Uncle Sam's soldiers who are guarding the International boundry line against raids into the United States by bands of any of the Mexican factions which are now trying to cut each others' throats.



THE TRUCK MADE THE 148-MILE TRIP BETWEEN LOS ANGELES AND SAN DIEGO * * * IN 13 HOURS

* * * EVEN THE MODERN DOG CATCHER NOW FINDS IT NECESSARY TO USE A TRUCK

When the trouble first started some time ago, a 5-ton White stationed at Los Angeles received orders to get to the line as quickly as possible with a capacity load of provisions. It was later detailed to duty between San Diego, Cal., and Techarte, the latter near the border. This truck is one of many which are still working along the border and furnishing Uncle Sam with first-hand data on truck operation which will be of unestimatable value in the government's present plans for preparedness.

Immediately after being detailed to the work. the White was loaded with the proper provisions and started on the first leg of its journey to San Diego. Many handicaps had to be overcome *en route*. Part of the trip had to be made through the deep sand of the low places and across the stretches of rocky coast where the roads were little more than rough trails hewed out of the mountain sides. In spite of these conditions, the truck made the 148-mile trip between Los Angeles and San Diego in the remarkably short time of 13 hours, an average of a little more than 11 miles per hour.

This speed showed conclusively the great mobility of the motor truck as compared to the army mule, which travels on level ground at an average rate of about 2½ miles per hour. What time it would have taken an army mule train to cover the distance over the poor roads with steep grades is only problematical.

On the truck's initial trip, it stopped a short time in San Diego and then proceeded eastward along the Mexican border. During the first 3 days of service it covered more than 300 miles and has since covered equal distances in the same time.

### Alaskan Dog Team Replaced by Ford

EQUIPPED with a special commercial body for carrying laundry, a Ford car in one of the mining camps in Alaska has recently replaced a dog team composed of Scotch collies which hauled a box on sled runners in winter and on wheels in summer. The dogs were kept tied up when not working and when teamed up for work showed great exuberance of spirit by galloping up and down the streets, often making sudden and unexpected dashes this way and that, much to the annoyance of anybody within striking distance. If those on the street did not get out of the way quickly enough, they were invariably relieved of various parts of their anatomy or clothing, much to the disgust of the dog owner and his pocketbook.

Up to the present time the Ford has not exhibited any signs of carnivorousness and has done the same work formerly accomplished by the dogs in much less time and in a more decorous manner. Also, to the relief of the driver, he now does not have to cook dog food.

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# Trucks May Displace Mail Tubes

## Government Has Not Renewed Contracts With Tube Co.

WASHINGTON, D. C., Jan. 3—It seems apparent now from the moves that the post office department is making through Postmaster General Burleson, that motor vehicles are to take the place of the underground tubes through which the mail is shot from the central stations to railway terminals and sub-stations in big cities like Boston, New York, Philadelphia, Baltimore and Washington. The company that has the contract for this work finds itself in very much of a quandary. It has built miles of tubes in the big cities and has a capitalization of some $5,000,000. But its contract with the government is now up. And despite all that it can do through its attorneys and others it is said that it cannot get the post office officials to renew the contract. Agitations have been started in some of the cities, and word passed to the Chamber of Commerce associations and business houses, notifying them that if the contract is not renewed the mail will be very much delayed, particularly outgoing mail. The post office officials say that they propose to use motor trucks to haul the mail to the railway terminals quickly, and that it can be done nearly as soon as by tube. To this the tube officials answer that mail to catch limited trains can be put in the post office at the last minute. At present there seems to be a deadlock, and some motor vehicle men are watching it, ready to put in bids the minute it may be announced that the tubes will be discontinued. It may be that the government may force the tube owners to concede a lower price for service or turn the tubes over to the department. Politics is said to be playing a part in the negotiations.

### TRUCKS FOR OHIO RURAL MAIL

COLUMBUS, O., Jan. 9—Notice of the introduction of motor vehicles for rural mail service in a large number of counties in Ohio was given by the post office department recently when announcement was made of examinations of prospective carriers on January 22. It is probable that the motor vehicle service will be instituted about April 1. The department expects to effect considerable saving by the use of motor trucks and at the same time to extend rural mail service.

The department requires that all persons who wish to enter the motor service shall take the examination. This applies equally to rural mail carriers now in the service and to new aspirants for employment in the postal service. Men between the age of 18 and 55 years who are residents of the county in which the rural route center is located are eligible for examination.

### MANY TRUCKS AT BOSTON SHOW

BOSTON, MASS., Jan. 9—Although the Boston motor vehicle show is 2 months hence, yet every inch of available space in the 6 acres of flooring of Mechanics building has been contracted for, and there are scores of passenger car, motor truck and accessory manufacturers and dealers who are clamoring for a chance to exhibit. Manager Chester I. Campbell is now considering the advisability of engaging an additional building to accommodate the overflow.

Boston is the only large city where trucks are exhibited. At the forthcoming show the entire lower floor will be occupied by truck displays. There are as many again who have made application for space. Manager Chester I. Campbell states that had he foreseen the extraordinary demand for space for commercial vehicles he would have had a separate show for them.

### 9,115 PENN. TRUCKS

HARRISBURG, PA., Jan. 7—During 1915 there were 9,115 motor trucks registered in Pennsylvania. Tractors numbered 2,196 and trailers 185.

### 4,000 TRUCKS IN KANSAS

KANSAS CITY, MO., Jan. 9—Final figures for the motor registration in the state of Kansas for 1915 show that about 4,000 trucks are in use.

### N. A. C. C. ENDEAVORS TO PREVENT FREIGHT CAR TIE-UP

NEW YORK CITY, Jan. 3—In an endeavor to prevent the tie-up of freight cars intended for the shipment of motor vehicles, the General Traffic Department of the National Automobile Chamber of Commerce has compiled a ready-reference book of the numbers of such cars owned by every railroad in the United States and has sent it to their officials, requesting that all such cars be put at once into the service for which they are intended. The letter accompanying each book states that 140,000 cars of motor vehicles were shipped on the railroads of the country during 1914 and that close to 200,000 carloads will be shipped in 1916.

### BROADWAY PAVEMENT STILL UNSETTLED

NEW YORK CITY, Jan. 6—A conference called today at the office of Marcus M. Marks, president of the Borough of Manhattan, of the city of New York, to consider the petition of the Motor Truck Club of America, Inc., and the New York Team Owners' Assn. to pave lower Broadway with granite block, broke up without anything definite having been accomplished except that Ralph Polk, Commissioner of Highways, Borough of Manhattan, will appoint a committee to look into the matter. Close to seventy-five representatives of various civic organizations were present. The Motor Truck Club was represented by its president, Theodore D. Pratt. Another meeting will be held as soon as the committee has been appointed.

### Coming Commercial Vehicle Events

| | |
|---|---|
| Jan. 18 | Newark, N. J., Monthly Meeting, Motor Truck Club of New Jersey, Automobile Club, 22 Washington place. |
| Jan. 19 | New York City, Monthly Meeting, Motor Truck Club of America, Automobile Club of America. |
| Jan. 20 | New York City, Monthly Meeting of the Metropolitan Section, Automobile Club of America. |
| Jan. 25 | New York City, Monthly Meeting, Electric Vehicle Assn. of America, Consolidated Gas Co. building, Irving place. |
| Jan. 25 | Newark, N. J., First Annual Smoker, Motor Truck Club of New Jersey, Achtel-Stetters restaurant. |
| Jan. 29-Feb. 5 | Columbus, O., Motor Vehicle Show. |
| Jan. 29-Feb. 5 | Minneapolis, Minn., Motor Vehicle Show. |
| March 4-11 | Boston, Mass., Motor Vehicle Show, Mechanics' Hall. |

# Gasoline Price Probe Initiated

## Congressman Asks Reason for High Prices

WASHINGTON, D.C., Jan. 4—A resolution calling upon the Department of Justice to advise whether it has begun prosecutions against those responsible for the increased price of gasoline was made today in Congress by Congressman Steenerson of Minnesota. The resolution further directs the Attorney-General to advise what steps he is taking in connection with reports that dealers in the commodity are violating the Sherman anti-trust law.

### CHICAGO GASOLINE DROPS

CHICAGO, ILL., Jan. 7—Gasoline prices in this city have dropped to 16½ cents, nearly 2 cents. The Standard Oil Co., it is said, is responsible for the low price.

Reports from the Oklahoma and Texas oil fields state that there is an oil famine and that the oil wells in those two states have slumped in production from 35 to 50 per cent. Gasoline prices, as a result, it is predicted, will reach 40 cents a gallon in the near future and oil by-products will be 35 to 40 per cent higher than at any time in the history of the United States.

### CANADA INCREASES TRUCK FEES

TORONTO, ONT., CANADA, Jan. 8—The proposed increase in fees for motor licenses in Ontario will be fairly heavy, particularly for small trucks carrying 2 tons and less. The small truck which now pays $5 in taxes will probably be called upon to pay double that amount. Trucks carrying over 2 tons will have to pay $5 for each ton or fraction of a ton above that minimum.

### E. V. A. TO TALK SELLING ON JANUARY 25

NEW YORK CITY, Jan. 13—"Selling Electric Vehicles" is the subject of a talk to be presented before the regular monthly meeting of the Electric Vehicle Assn. of America on Tuesday evening, January 25, by Day Baker of The General Vehicle Co., Long Island City, N. Y. As usual, the meeting will be held in the auditorium of the Consolidated Gas Co. building at Irving place. The talk will be illustrated by close to 200 lantern slides. In addition, it has just been arranged to show motion pictures pertinent to the subject, a new innovation at the meetings of the E. V. A.

### TRUCK CLUB TO TALK TRUCKS IN ENGLAND

NEW YORK CITY, Jan. 13—"Motor Truck Use and Methods in England, Before, During and After the War," is the title of a paper to be read before the regular monthly meeting of the Motor Truck Club of America, Inc., on January 19 by Edward W. Curtis, Jr., manager of the London branch of the General Vehicle Co., Long Island City, N. Y. The meeting will be held at the Automobile Club of America and will be preceded by the usual informal dinner at $1 per plate, held at the club at 6:30 p. m. Mr. Curtis is a former vice president of the Motor Truck Club. There will also be an open discussion after the reading of the paper on the influence of the European war on the American motor truck.

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# Army Mule Passing Says Wood

## Predicts Motor for Transport at S. A. E. Meeting

NEW YORK CITY, Jan. 6—"The day of the mule for army transport service is gone," said Major-General Leonard Wood, ranking officer of the Eastern Department of the United States Army, in a short but pithy speech which he delivered before the annual meeting of the Society of Automobile Engineers, held tonight at the Hotel Plaza in this city. He further dwelt upon the great importance of mechanical transport and the necessity of standardized vehicles for this work and the tremendous amount of organization required to make a proficient military transport system.

Secretary of the Navy Daniels outlined what he has done and what he hopes to do for the United States Navy and thanked the S. A. E. members of the civilian Naval Board for the great assistance which they had already rendered him.

### NEW JERSEY TRUCK CLUB SMOKER JANUARY 25

NEWARK, N. J., Jan. 6—The first annual smoker of the Motor Truck Club of New Jersey will be held at Achtel-Stetters restaurant, Newark, on Tuesday evening, January 25, at 8 p. m. John R. Eustis will be the principal speaker of the evening and will give an illustrated lecture on the use of motor vehicles in the present war.

### MOTOR VEHICLES FOR PARAGUAY DUTY EXEMPT

NEW YORK CITY, Jan. 7—Unused vehicles, including passenger cars and motor trucks, together with their accessories and spare parts, are exempt from import duty in Paraguay for a period of 2 years from November 9, 1915. The suspended duty on motor vehicles imported into that country amounts to 62 per cent ad valorem, including surtaxes.

### CELFOR TO MAKE M. & S. DIFFERENTIAL

DETROIT, Jan. 3—The Celfor Tool & Axle Co., Buchanan, Mich., has been licensed to manufacture the M. & S. differential as stock equipment for all of its axles as soon as manufacturing facilities can be completed. The Celfor company is building a plant in South Bend, Ind., for this purpose.

### C. H. MARTIN FORMS NEW CO.

SPRINGFIELD, MASS., Jan. 2—The Martin Rocking Fifth Wheel Co. has taken over the business and the patent rights of C. H. Martin, of this city. The officers of the new corporation are: C. H. Martin, president; Adolf A. Geisel, treasurer, and H. G. Farr, secretary. Mr. Geisel, who will have the general management of the business, was until recently eastern sales manager for the Denby Motor Truck Co., Detroit.

The tractor-semi-trailer business had grown to the point where it was necessary to take in additional capital in order to supply the fifth-wheel connections as fast as they were ordered. In addition to making fifth-wheels in different sizes for converting Fords into 1-ton tractors or those which make 5-ton trucks into 10-ton tractors, the new company plans to make semi-trailers for the Fords.

### MORELAND TRUCKS 5% DEARER

LOS ANGELES, CAL., Jan. 11—A 5 per cent increase in prices has been announced for 1916 by the Moreland Motor Truck Co., of this city. The reason given is that materials have increased in cost to such an extent that the increase in price on the Moreland models was necessary. While some of the materials used in the manufacture of the trucks have increased 300 per cent, the increase in price of the Los Angeles-made vehicles is but 5 per cent. This raise has been made on all models and will take effect immediately.

### STANDARD STEEL CAR TAKES OVER MODEL ENGINE

PITTSBURGH, PA., Jan. 3—The Standard Steel Car Co., of this city, has taken over the property, buildings and machinery of the Pittsburgh and Peru, Ind., plants of the Pittsburgh Model Engine Co., manufacturer of motor vehicle gas engines. The assets of the latter concern were valued at more than $1,000,000.

The production of the Model engines is to be continued and the output of the standard ears doubled.

### OVERLAND DELIVERY CARS SOLD BY ZONES

TOLEDO, O., Jan. 5—Coincident with the formation of Willys-Overland, Inc., as a selling organization for the parent company in Toledo, the 800-pound Overland delivery vehicle will henceforth be sold direct from headquarters located in thirteen new zones which cover the entire country.

The headquarter cities of the zones and the names by which the latter will be known are: Boston, Mass.; New York City; Philadelphia, Pa.; Atlanta, Ga.; Toledo, O.; Kansas City, Mo.; St. Louis, Mo.; Chicago; Minneapolis, Minn.; Omaha, Neb.; Dallas, Tex.; Denver, Col., and one city on the Pacific coast. G. M. Berry, formerly advertising manager for the Willys-Overland company, will be the director in charge of all branches.

### RECEIVER FOR TRUMBULL CO.

BRIDGEPORT, CONN., Jan. 2—Attorney E. K. Nicholson, of this city, has been appointed temporary receiver of the Trumbull Motor Car Co., this city, with a bond of $25,000. At a stockholders' meeting recently it was voted to discontinue the business of the concern and the officers asked for the appointment of a temporary receiver.

### DIVIDENDS DECLARED

ARDMORE, PA., Jan. 2—A 5 per cent dividend was voted by the directors of the Autocar Co., of this city, at a meeting held here last week. They also voted that $400,000 of the company's accumulated surplus be made a part of the permanent capital by issuing capital stock therefor.

DETROIT, Jan. 4—The Packard Motor Car Co., of this city, has declared a cash dividend of 1¾ per cent and stock dividend of 10 per cent on its common stock, payable February 1.

# Solid Tire Prices to Be Raised

## Kelly-Springfield Increases Pneumatics 7 to 20%

NEW YORK CITY, Jan. 11—The Kelly-Springfield Tire Co., of this city, has increased the prices on some of its pneumatic tires from 7½ to 26 per cent due to the jump in the price of rubber from 57 cents a pound last October to $1.05 this week. The company has not yet raised the prices of its solid tires but contemplates doing so in the very near future.

Some of the Kelly-Springfield prices, new and old lists, follow:

| Size | New | Old |
|---|---|---|
| 20 x 3 | $16.35 | $13.20 |
| 34 x 4 | 32.95 | 27.45 |
| 34 x 4½ | 40.55 | 33.80 |
| 36 x 4 | 35.00 | 29.15 |
| 36 x 4½ | 42.95 | 35.80 |

### WHITE ELECTS DIRECTORS

CLEVELAND, O., Jan. 5—At a meeting of the recently-formed White Motor Co., held in this city today, the following were elected directors of the company: Warren Bicknell, E. W. Moore, Otto Miller and J. R. Nutt, all of Cleveland; J. H. Harding, of C. D. Barney & Co.; Theodore Roosevelt, Jr., of Montgomery, Clothier & Tyler; E. R. Tinker, vice president of the Chase National Bank of New York. Windsor T. White will shortly be added to the board and made president of the company. Walter C. White and M. B. Johnson, of Cleveland, will also be elected to serve on the board.

### PACKARD SELLS $3,000,000 PREFERRED

NEW YORK CITY, Jan. 3—The Packard Motor Car Co., Detroit, has just sold $3,000,000 of 7 per cent cumulative preferred stock to William A. Read & Co., this city. The latter concern is offering it to the public at 104 and accrued dividend. The new stock is callable at any time on 90 days' notice and is redeemable at par on August 30, 1930. The cash received by the Packard company from the new issue will enable it to redeem all of its outstanding debenture notes, due next December.

### NEW FEDERAL 2-TONNER

DETROIT, Jan. 3—A new 2-ton model has just been brought out by the Federal Motor Truck Co., of this city. It is the result of an increased demand from Federal distributers and owners of Federal trucks for a vehicle with a load capacity between the 1½- and 3½-ton models previously offered by the Federal company.

Short specifications of the newcomer follow:

| | |
|---|---|
| Price | $2,100 |
| Wheelbase | 144 or 168 inches |
| Continental motor | 4⅝ x 5¼ |
| Ignition | Single, Eisemann |
| Gearset | Selective |
| Final drive | Worm |
| Tires (solid), fronts | 36 x 4 |
| rears | 36 x 6 or 36 x 4 dual |

### FROME A NEW TRUCK

MILWAUKEE, WIS., Jan. 6—The R. L. Frome Mfg. Co., a box manufacturer of Howard's Grove, Wis., plans to manufacture motor trucks on a small scale. The company expects to start production in March.

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## Little Things

IN THESE days when everyone in the truck industry is doing big things, it behooves us to consider, now and then, the little things, just as when too much attention is given to details, it is well to stand back and get a perspective on the big things in truck manufacture, sale and utility.

USERS have gotten the big idea that motor trucks are a better transportation medium both from service and economic standpoints than horse vehicles. They have also acquired a broader conception of the relative fields of horse wagons, gasoline trucks and electrics. What is chiefly needed at the present time is a better understanding among truck owners of the importance of minute attention to little things that impede rapid loading and unloading of motor trucks; more careful watching of possible overloads; better planning of the details of routes and routine, so as to increase the efficiency of the truck's working day; more watchfulness of the minor adjustments and repairs which keep the truck in prime condition and prevent the big repairs which result from neglect.

A CONTRACTOR on one section of the Broadway subway, New York City, near Times Square, has spent nearly a month developing a novel loading scheme for the 15-ton tractors and trailers which haul the excavated rock from the shafts to scows on the river. Instead of the ancient method of dumping the rock as it come in the mine cars, reloading it into 3-ton steel buckets, hoisting these to the surface by derricks and then setting them on top of the wagon or motor truck which was to carry them to the dump, this contractor has installed electric locomotive cranes on elevated platforms which lift the mine cars directly from their subterranean rails to railed decks beneath the platforms, from which they roll by gravity, six at a time, onto mammoth semi-trailers hauled by motor tractors.

Fourteen tons of rock are thus loaded and six empty cars unloaded in less than 10 minutes, whereas to load 6 tons by the old method took much longer.

Provided with the very latest and best in equipment below the surface, and with modern, efficient commercial vehicles on the surface, this contractor found that the effectiveness of the tractor-trailers was seriously interfered with because they were not being loaded rapidly enough. He did not find any big delays at any one stage of the process, but he was shrewd enough to perceive the many little delays which together caused the big delays. He spent money copiously to overcome these little hindrances because he did not let the bigness of his job and the great ability of his equipment blind him to the little

(Continued on page 59)

CAREFUL study of the trucks which Italy is now building impresses one with the painstaking attention to refinements of detail. There is nothing very startling about the general construction of Italian commercial chassis. Indeed, Italian engineers seem to have progressed less in chassis design, in simplifying the chassis, lightening it and increasing its flexibility than our own designers or those of other truck-building European nations. It is in the motor and in the control that one finds the development. In brakes, too, there is a wealth of refinement.

One maker has put his governor on the fan shaft. This construction permits of a compact grouping, gets the governor up out of the way, gives a straight horizontal connection to the throttle and prevents the disconnection of the governor without also stopping the fan. Valve inclosures as a rule are made of aluminum and quickly removable by large wheel handles, wing-nuts or lever-nuts. There are many motors with gear-driven fans, and the fans are usually of cast aluminum, as carefully designed as a ship's propeller. Piping is characterized by its directness and neatness. It seems to have been designed with the motor, not to have been attached as an after-thought.

Seat uses an aluminum dash with the floorboards integral, giving not only a neat appearance, but rigidity, a perfect fit, a clear passage for the cooling air-blast and an excellent support for flush instruments and the steering column. Many of the steering columns are adjustable and carefully fitted to the seat for the most restful and convenient driving position. The small piping of oil, gasoline and fuel-feed air-pressure is a joy in its neatness, simplicity, and staunchness notwithstanding. Block castings are almost universal. Carbureters are mostly bolted to these blocks and set high. All parts are accessible.

PERHAPS in performance our own vehicles, which must cost vastly less than the Italian jobs, will show up equally well, if not better, and will keep on doing so year after year. Nevertheless, there is much that we can learn from the Latin mechanic. Improvements in detail can be made that will mean less frequent attention, quicker and cheaper repairs and greater convenience of operation.

Grease cups on these vehicles are placed conven-

(Continued on page 59)

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# Mars Father of Italian Trucks

By W. F. Bradley

Large picture above, Fiat army tractors in the erecting room of their Turin home. Insert, batch of Fiat 3½-ton army trucks ready for delivery

MOTOR VEHICLE factories in Italy have been converted to commercial vehicle plants for the home and Allied governments. Prior to the war Italy's specialty was high-grade touring cars, the truck business being of comparatively small volume, for local demand was restricted. Public passenger carrying services were well developed, for Italy's natural conditions make is possible for the motor vehicle to penetrate where the railroad can not be taken with advantage, but motor trucking had not been given very great attention.

### Factories Concentrate on Trucks

The entry of Italy into the war changed conditions, and instead of building touring cars, the whole of the factories are now devoted to army trucks varying from 1 to 4 tons capacity. Where touring cars are still being built, they are mostly for army consumption; aviation motors help to keep the factories busy on a 10- to 12-hour shift 6 days a week. Italy enjoys the position of being the only one of the Allied nations not having to import trucks for army use. Whereas France, England, Belgium and Russia are making use of big fleets of American trucks, there does not appear to be a single truck of foreign construction in the Italian army.

A few enterprising American manufacturers appear to have looked into the market, but so far as can be gathered from a close inspection on the spot, no orders have been placed. The same applies to touring cars; practically all, whether in military or civil service, are the home product. Ford has secured a footing, and a certain number of Ford cars are used for light trucking; but the volume of business never has been great and has not been increased owing to the war.

Close scrutiny of the front end of the giant Fiat tractor discloses a crank handle large enough for three men, a substantial radiator guard and a steam whistle on the radiator cap

The self-sufficiency of Italy was largely brought about by the manner in which the country entered the war. When France, England, Belgium and Russia became involved with Germany and Austria, the Italian manufacturers set about the necessary conversion so as to meet the great demand for army trucks. The leading truck factories—Fiat, Scat, Spa, Diatto and Bianchi—delivered large quantities to the Allies and some to Germany. When it became evident that Italy was going to be involved, first the supplies to Germany were cut off, then deliveries to the Allies were reduced, and finally the whole of the factories were involved in productions for the Italian army.

### Reinforced Touring Chassis

Those factories which had not specialized on trucks brought out 1- and 2-tonners which were really strengthened touring car chassis. While the 3- and 4-tonners must of necessity be a special design, for lesser loads good service can

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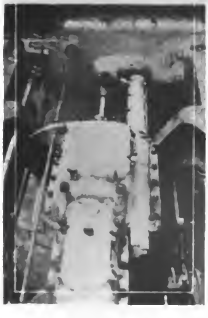


Fiat 6-ton 70-horsepower Alpine tractor. Note the creeper track carried above rear wheel when not in use, 71-inch rear wheels, steel-tired and cases around drive chains. Below, detail of gearbox. The casing under the cab houses the selector mechanism and silent chain drive to the winch shaft to the left. Jackshaft brakes, between differential and frame members may be seen. Observe characteristic rigidity throughout

be obtained with a reinforced touring car chassis. Italy appears to possess a greater proportion of this type of chassis than any army in the field; they are giving good service, but their operating costs, running on pneumatic tires, must be higher than with pure truck types. Against this there is the advantage that the nation has not had to make purchases abroad.

### Italy's Abundant Resources

The war has caused less disturbance to the Italian factories than to any in Europe, for it has been an easy matter, where necessary, to change from touring cars to trucks, and there has been no attempt to make these factories produce ammunition and war material for which they were not specially designed. The ample warning which Italy received enabled her to make much better arrangements for the war period than was possible by most of her neighbors. In particular she took advantage of the warning to increase her stock of raw material, most of the factories now carrying immense stocks which will enable Italy to produce normally even if material becomes much rarer than it is at present.

All supplies have increased in price, but this increase is common to the whole of Europe, and indeed the whole world. As a matter of fact, Italy was not long in discovering that she could produce within her own territory most of the material necessary for motor truck construction. Turin, the center of the industry, has exceptional facilities for making castings and has at hand all the materials necessary with the exception of coal, which has to be procured from England and costs about $35 per ton.

There was much dependence on Germany and Belgium for high-grade steels and for forgings. After the invasion of Belgium quantities of forgings were shipped into Italy, the German authorities giving facilities for this, and endeavoring as far as possible to get the Belgian plants into working condition. At that time it was thought Italy would remain neutral; since then, supplies from Belgium have necessarily been cut off. At the present time many of the Italian forgings are produced locally, while supplies are procured from England, America, and a few from France and Switzerland.

### A Magneto Famine

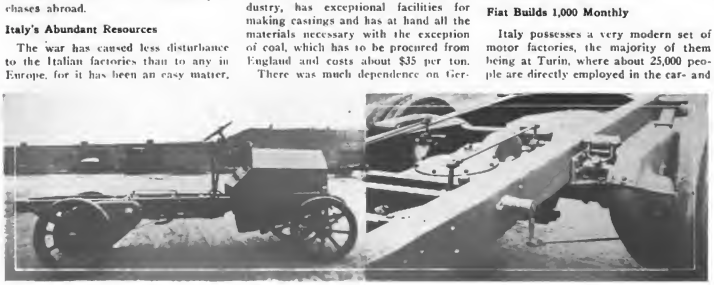
One of the greatest difficulties has been to get an adequate supply of magnetos. No Italian motor, whether the cheapest or the most costly production, is dependent on battery ignition; and as Italy has not devoted any attentiop to the construction of magnetos, she was hard hit when supplies were stopped from Germany. At the present time America is delivering most of the magnetos required for Italian trucks. The only magnetos found in the various factories were from the U. S. A. or were of German construction taken from stock. It was stated that arrangements had been made for the construction of magnetos in Italy but no finished articles were observed.

### Must Use U .S. Magnetos

English magnetos were on the market for a time, but appear to have been driven out; French-made magnetos are declared to be difficult to obtain and are too costly. The American magneto, in spite of prejudice, is proving to be a lifesaver to the Italians. All manufacturers candidly state that they have no desire to renew relations with Germany after the war, but if German magnetos have to be kept out the rival must be better than it is at the present time.

### Fiat Builds 1,000 Monthly

Italy possesses a very modern set of motor factories, the majority of them being at Turin, where about 25,000 people are directly employed in the car- and



Spa heavy chassis for 6-inch gun mounting, with a detail of the jackshaft, springs and pressed-steel chain housings which act as radius rods

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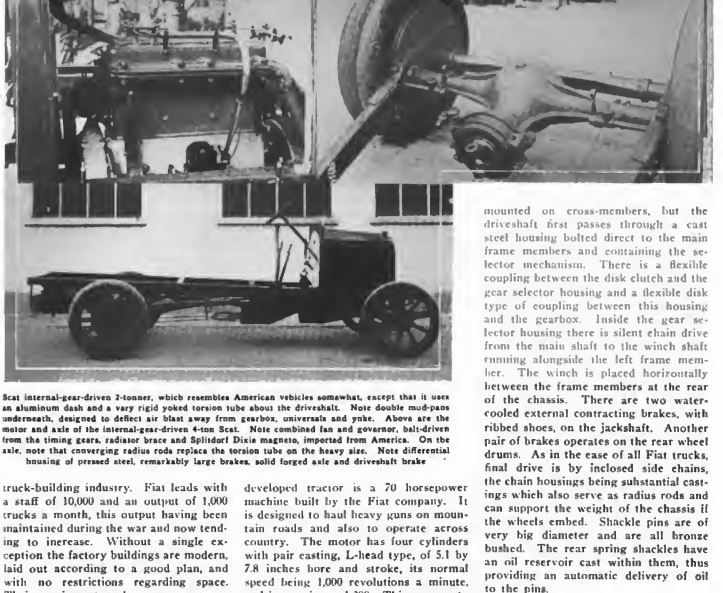

Scat internal-gear-driven 2-tonner, which resembles American vehicles somewhat, except that it uses an aluminum dash and a very rigid yoked torsion tube about the driveshaft. Note double mud-pans underneath, designed to deflect air blast away from gearbox, universals and yoke. Above are the motor and axle of the internal-gear-driven 4-ton Scat. Note combined fan and governor, belt-driven from the timing gears, radiator brace and Splitdorf Dixie magneto, imported from America. On the axle, note that converging radius rods replace the torsion tube on the heavy size. Note differential housing of pressed steel, remarkably large brakes, solid forged axle and driveshaft brake

truck-building industry. Fiat leads with a staff of 10,000 and an output of 1,000 trucks a month, this output having been maintained during the war and now tending to increase. Without a single exception the factory buildings are modern, laid out according to a good plan, and with no restrictions regarding space. Their equipment and management are also of a very high order.

### Italians Stick to Chain

Chain-driven trucks predominate in the Italian army, for Fiat, the biggest producer, builds all the heavier trucks with chains, and Spa, the next important maker, doing likewise. All chains on Italian trucks, however, are inclosed in cast steel and sheet metal housings. There does not appear to be a single truck in use with exposed chain drive. Scat, another big producer, uses internal-gear drive for the big units and bevel for 2-ton models. All other makers use bevel gear drive sometimes, as in the case with Spa, with a spur gear reduction within the differential housing.

There are no four-wheel-driven trucks in Italy, although several tractors are produced. Steamers are not used in any capacity. Electrics are employed on city work, but not in connection with military operations. The most commonly employed as well as the most highly developed tractor is a 70 horsepower machine built by the Fiat company. It is designed to haul heavy guns on mountain roads and also to operate across country. The motor has four cylinders with pair casting, L-head type, of 5.1 by 7.8 inches bore and stroke, its normal speed being 1,000 revolutions a minute, and its maximum 1,300. This appears to be the only motor made by Fiat in other than a block casting, very much larger racing motors having been made with four cylinders cast together. The crankcase is cast steel mounted on a subframe. Ignition is high-tension with the magneto driven off the same shaft as the pump. The half-compression device automatically retards the magneto as it is put into operation, the full advance being given with full compression, the ignition point then remaining unchanged. As a motor of this size is not likely to be easy to start, the crank is of sufficient length for three men to take hold of it. Lubrication is under pressure to all parts of the motor, and the steering gear also has a positive oil feed, operated from the dash.

### Chassis Very Rigid

A very rigid type of chassis is obtained by heavy longitudinal members and closely-placed cross members with gussets. The four-speed gearbox is mounted on cross-members, but the driveshaft first passes through a cast steel housing bolted direct to the main frame members and containing the selector mechanism. There is a flexible coupling between the disk clutch and the gear selector housing and a flexible disk type of coupling between this housing and the gearbox. Inside the gear selector housing there is silent chain drive from the main shaft to the winch shaft running alongside the left frame member. The winch is placed horizontally between the frame members at the rear of the chassis. There are two water-cooled external contracting brakes, with ribbed shoes, on the jackshaft. Another pair of brakes operates on the rear wheel drums. As in the case of all Fiat trucks, final drive is by inclosed side chains, the chain housings being substantial castings which also serve as radius rods and can support the weight of the chassis if the wheels embed. Shackle pins are of very big diameter and are all bronze bushed. The rear spring shackles have an oil reservoir cast within them, thus providing an automatic delivery of oil to the pins.

### Detachable Creeper Drive

The feature of the tractor is the use of 71-inch diameter cast steel driving wheels with a herringbone ribbed face, designed to receive a broad flexible metal band similar to that employed for caterpillar tractors. There are projecting studs from the inner face of the wheels to provide for attachment of the band; when not in use on the wheel, these bands are carried on the top of the platforms which also form rear wheel fenders. The winch, mounted horizontally just within the rear of the frame, provides 50 yards of ½-inch steel cable. Cast steel wheels, fitted with Goodrich single tires, are used in front. The spring assembly on these tractors is interesting, for instead of a center bolt the leaves have a central groove and are united by being forced into a box-like housing, the base of which corresponds with the spring seat on the axle. Four bolts attach this assembly to the axle,

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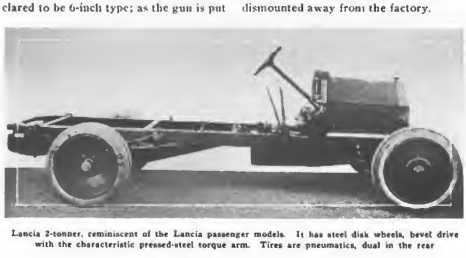
thus doing away with the U-clips encircling the leaves.

Full weight of the unloaded tractor is a little more than 7 tons; the useful load is from 5 to 6 tons, and the normal speed with the motor turning at 1,000 r. p. m. is 5.6 miles an hour. Being intended for Alpine work, the first gear is very low, being .86 miles an hour at a motor speed of 1,000 revolutions. With bands on rear wheels the tractor will haul 100 tons over good macadam roads, and will climb a 15 per cent gradient with 20 to 25 tons in tow. With a load of 5 tons aboard, but without trailers, the tractor will climb a 30 per cent gradient. Without bands on rear wheels it will climb a 12 per cent gradient with 5 tons aboard and 10 tons in tow; a 6 per cent gradient can be tackled with 20 tons in tow. This tractor has been in use a considerable time and has been put to severe tests in the Alps. According to all available information it has been a complete success.

Isotta-Fraschini is also producing a heavy type of slow-speed gasoline tractor equipped with steel wheels front and rear. This vehicle is designed primarily for working across country, and although differing considerably in detail is of the same general design as the Fiat.

### Spa Chassis for Big Guns

At the Spa factory a special chassis is being produced for carrying a gun declared to be 6-inch type; as the gun is put in position by the artillery department, there was no opportunity of investigating the mounting or verifying the size. All that the motor truck engineers have had to do is to produce a chassis capable of handling a given load. It is understood that the chassis is fitted with jacks, taking all weight off the springs when the gun goes into action, the same as is done with the French 75-millimeter motor-mounted guns. This Spa chassis has a four-cylinder motor of 3.7 by 7.8 inches bore and stroke, limited to 800 r. p. m. The cylinder casting is unique, for not only are the four cylinders in one block, but the water pump is inside the cylinders, the intake manifold is integral, and even the jets are within the cylinder casting, only the float chamber being external. Pump and fan are driven off the same shaft. The magneto is alongside the motor, just to the rear of the timing gear housing. The timing gear is driven by a silent chain. The exhaust manifold is separate, the integral manifold being found to retain too much heat on these big motors. The first three exhaust ports are oval sectioned at the mouth, so as to give a lead of the gases towards the rear. With a view to clean lines some firms have attempted to use an integral exhaust manifold, but while there is no disadvantage for small motors, it was found that with big power plants cracked cylinders were plentiful when heavy duty was undertaken in the Alpine regions. The intake water arrangement of the Spa, which has no manifold, is particularly neat. As in the case of most Italian trucks, iron is used in place of aluminum for the crankcase of the Spa. This is not due to any shortage of aluminum, for this metal is employed very extensively on Italian trucks, being general for dashes. There are no paper gaskets between the cylinder and crankcase and the crankcase and oil pan of the Spa motors. The surfaces are finely ground and polished so that they can be put together direct without any fear of oil leakage. It is declared that this fine finish is worth while on account of the time saved when the motor has to be dismounted away from the factory.



Lancia 2-tonner, reminiscent of the Lancia passenger models. It has steel disk wheels, bevel drive with the characteristic pressed-steel torque arm. Tires are pneumatics, dual in the rear

Apart from the motor, the chassis design is classical, the drive being taken through a four-speed gearbox to jackshaft and then by inclosed side chains to cast steel rubber-tired road wheels. There are two external contracting brakes on the jackshaft and internal brakes on the road wheels.

### Scat Uses Internal Gears

The leading Scat model is a 4-tonner with internal-gear drive, the motor being a block cast, four-cylinder, of 3.9 by 5.9 inches bore and stroke. The motor is governor controlled, the governor and fan being combined and the two being raised together when it is necessary to tighten up the belt. The motor is the usual Italian L-type with integral intake manifold and external exhaust manifold. On a 2-ton model the manifold is combined with the cylinder casting, instead of being separate as is the more general practice. Scat has its own foundry, one of the most important in Italy, and maintains that the cleaner lines and the saving of a joint more than compensate for the complication of casting such a set of cylinders. On the 4-ton Scat the gearbox is undivided and has the base deeply ribbed. Most of the work is in the mountains, and as overloading is general, it is often necessary to use one of the low gears for several hours at a time. Under such conditions the ribs are found to be advantageous in dissipating heat. Brakes are on the road wheels and at the end of the driveshaft, just behind the rear universal joint. Cast steel wheels are made use of on the 4-ton model, and wood on the 2-ton type.

### Steel Wheels Expensive

As a rule, wood wheels are not found on Italian trucks; owing to the high cost of cast steel some makers have experimented with wood, but have found it advisable to return to metal. On the lighter type trucks, fitted with pneumatic tires, the general practice is to use detachable disk wheels, formed of a stamping welded to a steel rim. These are found on 90 per cent Italian trucks carrying a 2-ton load and less. They are cheap and easy to build, and from the users' standpoint have the advantage of being easily washed.

Bianchi, one of the leading Milan firms, is interested in 3-ton trucks, as well as in armored cars and passenger cars for military purposes. One of the features of the Bianchi truck is the placing of the motor governor at the front end of the driveshaft, where it restricts the speed to 18 miles an hour. The advantage claimed is that the full power of the motor can be secured on low gears, when it is most required. The Italian authorities are in complete agreement with the experts of other countries on the necessity of governors for army trucks.

Lancia, Nazzaro, Itala, Isotta-Fraschini and other firms are producing in a smaller degree considerable quantities of light and fast trucks carrying 2-ton maximum loads. These are nearly all the firms' passenger cars designed and strengthened for heavy service and equipped with twin pneumatic tires on the rear wheels. Lancia in particular is turning out large quantities of these for both the Italian and the British armies. Generally these motors are of the four-cylinder type and have bores and strokes of 3.9 by 5.5 inches with cylinders cast in block. This type of chassis is also very largely used as an armored car, carry-

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ing 5-millimeter nickel steel plating and armed with a couple of machine guns. In several cases the difficulty of front-wheel protection has been overcome by the use of cast steel wheels and band tires, the rears having twin pneumatics almost entirely inclosed. With steel wheels and solid tires there is no necessity for armor plating.

### Tank Trucks Advantageous

Among special cars in use with the Italian army are tank trucks carrying gasoline to the front. The rear of the tank carries pump and measuring instruments of the Bowser system. Other nations carry gasoline in 1- or 2-gallon cans.

There is no distinct type of truck which must be built in order to meet Italian army requirements. When war broke out, practically everything on wheels was pressed into service, and since then the greatest demand has been for 3- and 4-ton models. The 1- and 2-ton types on pneumatic tires are used in big numbers, but it appears to be because several firms were not capable of producing a pure truck type at short notice. There is no well-developed truck subsidy scheme in Italy, such as exists in France. Design is varied, but as there are only five or six makers capable of building in quantities, there is not much complication of types in service at the front. The typical Italian army truck has a four-cylinder motor of 4-inch bore or slightly less, and long stroke with cylinders cast in block. Without a single exception they have high-tension ignition, forced-feed lubrication and pump circulation. Clutches are practically all of the disk type, and four-speed gearboxes are invariable. There is plenty of variety in final drive, the only type not used being the worm. The Hotchkiss drive is not found on any Italian truck, although it is used on a number of the French army trucks. Cast steel wheels, of the spoke type, are invariable, and are generally fitted with dual tires at the rear. Left side steering is not used. Dashes are nearly all of cast aluminum or sheet steel.

### All Motors Under Hood

There are no trucks in Italian service with motors under the drivers' feet. As the Italians have to operate in more mountainous country than any in Europe, there is evidently no value in the argument that for hill work too much weight is thrown on the rear with the motor-under-a-hood truck. The standard army body is of the platform type with detachable sides and rear, fitted with demountable metal hoops for carrying a canvas top. The top for the driver is entirely independent of that over the body, so that the men in charge get protection in whatever condition the truck may be used. This is a feature which has had to be insisted on in all trucks doing war service.

Latterly the hoops on Italian trucks have been strengthened and fitted with rings, so that a certain amount of the load can be suspended and if necessary stretchers attached to the top. This is a point which has proved of importance since the war, for there are times when trucks must be used to carry back wounded men. Tool and kit boxes are mounted under the overhanging portion of the body, immediately to the rear of the driver's cab. Gasoline tanks are more often under the seat than under pressure and they are not carried on the dash. Better provision is made for drawing off water from the radiator, pump and cylinders than is usual on other European trucks. Climatic conditions make this necessary. Tow hooks, generally bolted to the frame members, are used front and rear, and radiator guards must be fitted.

### War Boosts Truck Use

As a result of the war Italy is likely to become a greater user of commercial vehicles. Military operations have caused a shortage of horses and mules, with the result that business firms which had been quite content with animal traction have had motors forced on their attention. Despite the war orders, it has been possible to take care of this demand, and the belief is expressed that there will be an important extension of commercial vehicle operation when peace conditions are restored.

## Cincinnati Studies Control of Pedestrian Traffic

CINCINNATI, O., Jan. 9—The city authorities and the judiciary of Cincinnati have both taken up the question of obedience to traffic rules and ordinances and the result is a more stringent observance of the laws which are now in force. Steps are also being taken to have enacted more rigorous laws for the control of traffic on the streets of the city.

Judge O. J. Cosgrove, presiding in the criminal division of the courts, devoted a large portion of his charge to the grand jury to the prevention of traffic accidents. He called attention to the new traffic problems caused by the wonderful development of motor vehicles and also the greater danger to life and limb caused by their operation. Motor vehicles have come into power, and the cutting down of speed will endanger the efficiency of their use. In the meantime the speed of pedestrians has not increased in the same ratio with that of motor-driven vehicles. As a result, greater care is necessary to safeguard lives and health.

Judge Cosgrove said among other things: "For a long time an investigation of the traffic laws has been under way in an effort to discover a statute under which persons who carelessly drive horses or motors in the streets violating traffic laws and endangering life and limb, could be prosecuted for a felonious act. The laws, however, make all these violations of traffic laws misdemeanors only, which are not subject of investigation by the grand jury.

Because of this fact considerable agitation has been started toward having the legislature enact laws whereby persons who recklessly disregard life and limb in their violation of traffic laws and ordinances can be charged with a felony and more vigorously prosecuted. Those favoring such enactment believe that laws of this sort would result in more care by drivers of horses and motors, and would result in fewer accidents.

"However, the researchers do not place all the blame upon the drivers for the many accidents. They declare that the pedestrians are more often to blame, and it was along the lines of starting an educational campaign that will result in men, women and children pedestrians being taught the necessity for them to take precautions which will insure to them greater safety while in the streets and highways that the court decided to act."

### URGE STATE TRAFFIC COMMISSION FOR NEW YORK

NEW YORK CITY, Jan. 5—The appointment of a state traffic commission by Governor Whitman, the members to serve without compensation and to be representative of the interests throughout the state concerned in the use of public highways, is advocated by the Safety First Society of New York.

The purpose of the proposed commission is to make a thorough investigation of the present traffic conditions and regulations, police signals, railroad crossing signal devices, road signs and other pertinent subjects with a view to securing uniformity of such traffic regulations. Both New Jersey and Ohio have such commissions, which have done much to better traffic conditions in their respective states.

## Truck Is Baker's Best Boost

(Continued from page 47)

the Wagners have thought of so using them. As yet, however, it has not been necessary to make such a complete utilization of the truck as this and meanwhile the drawers have been used as tool boxes, furnishing ample room for that purpose and at the same time being conveniently accessible.

But it gets severe usage; minor accidents always happen; mudguards got twisted; one of the big lamps in front was put out of commission and the single lamp has been mounted as shown in the illustration; no paint will stand up in pristine bloom for 3 years under all weather conditions, and this truck, though still up to all the demands made on it for actual service, does not rank as high in advertising value as it did. The management realizes this thoroughly, which is one of the reasons for the second truck, so that the first one may be laid by for a thorough overhauling. Without it the company is lost for its deliveries. That is why it has permitted the truck to get somewhat battered up, preferring to lose the incidental advantage rather than the service.

The looks of a baker's delivery outfit will naturally prejudice the observer either for or against the baker's product. Appreciation of this psychological proposition has enabled the Wagner Bakery to get more than value received out of its white White truck.

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## Résumé of Plans and Products of American Commercial Vehicle Makers

(Continued from page 16)

mostly in upper New York state. Its motor is mounted on an independent sub-frame, supported on three points, which can be removed from the front without disturbing the floorboards or seats.

King trucks are guaranteed for use with trailers when the conditions of service are approved.

### Kisselkar

**SIX MODELS, ½- TO 6-TON CAPACITY**

**Kissel Motor Car Co., Hartford, Wis.**

TWO NEW MODELS, a ½-tonner and a 1-ton unit, brought out during 1915, have been continued in this year's line of Kisselkar trucks which consists of six models. The other four sizes are of 2, 3, 4 and 6 tons capacity, respectively. These sized trucks were made last year, all with chain drive. For this year, the 1-tonner is worm driven while the others remain chain driven. The new ½-tonner is bevel driven.

Kisselkar motors are made by the concern, the other parts being assembled. Kisselkars are sold throughout the United States and also abroad. Motor starting outfits, dumping bodies and other special equipment are furnished on order. The trucks are used in connection with trailers.

### Kleiber

**NEW WORM-DRIVEN LINE OF FOUR MODELS**

**Kleiber & Co., Inc., San Francisco, Cal.**

CALIFORNIA MADE, Kleiber trucks differ from those of last year in that all are worm driven instead of chain driven. A new 5-ton model has been added for this year and the 1½-, 2½- and 3½-ton units carried over without change except for the use of worm instead of chain drive.

Kleiber trucks are an assembled product which is sold principally in California, Oregon, Washington, Hawaii and the Philippines. They may be bought on time by responsible parties. The Kleiber company does not indorse electric starters on its trucks but will so equip them if the purchaser desires. The vehicles are indorsed for use with trailers.

### Knox

**NEW FOUR-WHEELED UNIT**

**Knox Motors Co., Springfield, Mass.**

NEW IN 1915, the Knox four-wheeled tractor is continued without change for this year. It follows the same general design of the three-wheeled models formerly made by the Knox company. The new model differs from its three-wheeled predecessors in that it has hydraulic instead of the conventional type of brakes; a differential lock which was not formerly fitted; a new self-governing motor and a compact control board between the steering column and the dash.

The self governing of the motor has been secured by arranging the valve sizes and timing so that the motor accelerates rapidly to 1,000 r. p. m. and at this speed produces its maximum power. At higher speeds it develops less power so that under load the motor is prevented from exceeding 1,000 r. p. m., although with light loads it may attain higher speeds on good roads.

The present Knox tractor is the successor of the old Knox-Martin three-wheeler, the first of all the semi-tractors to be put on the market in this country. The vehicle is partly assembled and partly manufactured and is sold throughout the United States and also in foreign countries. It is characterized by its compactness, short wheelbase and cantilever springs to support the rear of the tractor and independent springs to carry the fifth-wheel and the front end of the semi-trailer. It is equipped with a starting and lighting unit as regular equipment.

### Koehler

**NEW 1-TONNER INTERNAL-GEAR DRIVEN**

**H. J. Koehler S. G. Co., Newark, N. J.**

FEATURED by its low price of $870 in the chassis or $895 complete with body, the 1-ton Koehler of 1916 is entirely different from last year's model except the capacity, which remains the same. The new model has a four-cylinder motor placed under a hood, vertical finned-tube radiator with a cast case, selective gearset and internal-gear drive. The old model had a two-cylinder motor under the body, a planetary gearset and drove by double chains. The Koehler truck is mostly manufactured, although the rear axle and also other small parts are purchased outside. It is sold throughout the United States and in several foreign countries.

Most Koehler trucks are sold complete with bodies of either the express or panel type.

### Lambert

**CHAIN-DRIVEN MODELS OF ½, 1 AND 2 TONS**

**Buckeye Mfg. Co., Anderson, Ind.**

DROPPING its 1,500-pound and 1½-ton models of last year, the Buckeye company's offering for 1916 consists of three models of ½-, 1- and 2-ton capacity, all chain driven, carried over from last year without change except in the case of the 2-tonner, which has been reduced from $2,200 to $2,000. The Lambert truck is an assembled product sold in the central states.

All three 1916 models employ friction drive. Electric starting and lighting units are furnished as optional equipment. Lambert trucks are indorsed for use with trailers.

### Lange

**1- AND 2-TONNERS, BOTH CHAIN DRIVEN**

**Lange Motor Truck Co., Pittsburgh, Pa.**

TWO MODELS of 1- and 2-ton capacity, both chain driven, are the Lange offering for 1916. They are carried over from last year without change in design, although the price of the 1-tonner has been reduced $500 and that of the 2-tonner, $650. Lange trucks are assembled and are sold principally in western Pennsylvania, eastern Ohio and West Virginia. They may be bought on a time-payment plan with from 25 to 50 per cent of the price on order and the balance in equal monthly installments.

The Lange company does not indorse the use of electric starting units.

### Lombard

**NEW TRACTOR OF THE CREEPER TYPE**

**Lombard Auto Tractor-Truck Corp., New York City**

MADE IN GOTHAM and new in 1915, the Lombard tractor is characterized by its drive through creeper units of the track-laying type. Besides the type of final drive the unit is distinguished by worm-gear drive to a jackshaft which carries the forward ends of the creeper chains; steel front wheels and optional four-, six- or eight-cylinder motors under a conventional hood forward of the dash.

The Lombard tractor is practically wholly manufactured. Up to the present time it has been sold mostly in New England and Canada. It can be purchased on installments by responsible parties who are required to pay 50 per cent in cash with the order and give a short-term mortgage on the vehicle to cover the balance due.

It is sold stripped but special bodies are made on order. The vehicle is electrically lighted but is not furnished with a starter as standard equipment. The Lombard is particularly adaptable for hauling trailers. The tractor can carry a load of 5 tons and can haul from 20 to 50 tons on the required number of four-wheeled trailers.

### Locomobile

**3- AND 4-TON WORM-DRIVEN MODELS**

**Locomobile Co. of America, Bridgeport, Conn.**

BROUGHT OUT in March, 1915, the 3- and 4-ton worm-driven trucks of the Locomobile company are carried over for this year without change. These vehicles differ from former Locomobile practice in that they have their motors under hoods forward of the drivers' seats instead of under the floors and worm drive instead of chain drive. Both new models are equipped with wood wheels and are essentially the same except for heavier rear springs and rear tires on the 4-tonner.

Locomobile trucks are almost entirely manufactured. They are sold in the United States and abroad. They are mostly sold as stripped chassis, although the Locomobile company will build special types of bodies on order. Locomobile trucks are indorsed for use in connection with trailers.

### Little Giant

**THREE MODELS—TWO NEW—¾-, 1½- AND 2-TONNERS**

**Chicago Pneumatic Tool Co., Chicago**

CONTINUING its 1½-ton chain-driven model with the motor under the floor practically without change, the Chicago Pneumatic Tool Co. has brought out two new worm-driven models of ¾- and 2-ton capacity. Each of the new types follows standard truck designing practice and has its motor under a hood forward of the dash and a low, easily-accessible cab.

Little Giant trucks are assembled from standard parts and are sold throughout the United States and also abroad. They may be purchased on a time-payment plan in which one-third of the selling price is required with the order and the remainder in eleven equal monthly notes.

The two models are electrically lighted but are not equipped with starters. Little Giant trucks are indorsed for use with trailers, several models of which are manufactured by the Chicago Pneumatic Tool Co.

### Lippard-Stewart

**SIX WORM-DRIVEN MODELS, ½ TO 2 TONS**

**Lippard-Stewart Motor Car Co., Buffalo, N. Y.**

ALL MODELS worm driven, the Lippard-Stewart line for 1916 consists of five units of ½, ¾, 1, 1½ and 2 tons capacity. All of these are the same as last year except the 1,000-pounder which is new. The ¾-ton model is regularly furnished with final worm drive but can be had also with bevel drive at $100 less.

Lippard-Stewart trucks are an assembled product that is sold throughout the United States and in England, France, Spain, Holland, Australia and the Philippines. They may be purchased on several month by installments if 50 per cent of the price is paid with the order.

Lippard-Stewart vehicles are characterized by their French hoods. The ½- and ¾-ton models are furnished complete with bodies. Bodies for the other sizes are made on order. An electric starting and lighting unit is furnished as standard on the 1,000-pounder and as special equipment on the others.

### Larrabee

**WORM-DRIVEN MODELS OF 1½ AND 2½ TONS**

**Larrabee-Dayo Motor Truck Co., Inc., Binghamton, N. Y.**

MAKING ITS DEBUT late in 1915, the Larrabee truck is really among the newcomers for 1916. It is offered in two models of 1½ and 2½ tons capacity, both worm driven and both following generally-accepted truck designs. They are assembled vehicles which will be offered for sale in the east.

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**10 PER CENT GOOD ROADS IN U. S.**

NEW YORK CITY, Jan. 3—Less than 10 per cent of the roads of the United States are dependable for the all-year-round use of motor vehicles, according to S. M. Williams, sales manager of the Garford Motor Truck Co., Lima, O. That concern, under the leadership of Mr. Williams and at its own expense, started a good roads campaign at the beginning of 1915 which has already resulted in the appropriation of many thousands of dollars for road improvement. The company has published many educational pamphlets showing the advantages of good roads and giving testimonials of the work which the Garford concern has already accomplished.

It has just written letters to all the manufacturers of passenger cars and motor trucks in the United States, asking for co-operation in good roads work. This will benefit not only the users of motor vehicles but themselves as well, because there will be a greater demand for motor units of all kinds when the 90 per cent of the roads now impassable for the greater part of the year are made fit for continuous all-year use.

The figure of 10 per cent of improved roads in this country was secured from the 2,565 answers received to a series of 3,440 letters sent to dealers of passenger cars and motor trucks all over the United States. Of these, 906 reported that roads in their territory were impassable for 25 to 50 per cent of the year; 574 reported from 50 to 75 per cent of the year, and 167 from 75 to 100 per cent.

**SAN FRANCISCO SANDS STREETS**

SAN FRANCISCO, CAL., Jan. 5—For the past 6 months San Francisco's street department has been reducing motor vehicle accidents by sanding the streets on wet mornings and rainy days. With three sand spreaders, operated by three men, a film of sand is spread over Market street, Geary street and Van Ness avenue, the three great arteries of the city, making motor vehicle traffic safe on the wet days. To cover the area, about 100 blocks, it now requires about 6 cubic yards of sand. This sand costs $1.75 per cubic yard, dried and on the spreader. It is estimated that it costs the city $20 per day to do the sanding. The cost is a small matter, however, compared to the satisfaction that the non-skid streets bring to drivers of motor vehicles.

# Little Things

(Continued from column 1, page 52)

weaknesses that existed before the change was made.

The garage manager of a department store in one of the eastern cities has eliminated more than half the mechanical troubles experienced in his fleet by the requirement that each driver shall himself wash his truck each evening. By washing, this man does not mean a superficial removal of mud and dust from the side panels, the wheels and the fenders. He is not satisfied if, in peering beneath the frame he finds the rear axle crusted with mud, the insides of the springs dirty, or the universals unclean. The consequence is that it is very rarely that a lost nut or cotter pin escapes the notice of the man whose safety depends upon the mechanical health of the chassis. These drivers are not required to do their own repairing, but the chassis are inspected by the manager of the garage daily and in case of trouble, they are held responsible for derangements not reported.

Clerical work is often the bane of a driver's life. A certain amount is essential, especially in package work. One store in a small city has provided each truck with a convenient holder for call tags, which not only prevents the loss of these, but permits the driver to sort them according to his route and to keep them in plain view so that none shall be overlooked and necessitate retracing the route.

Another provides a printed route card by which the driver may list his deliveries under the printed names of the streets on his route so that a glance shows him what streets he has to cover, and what calls, deliveries and collections are to be made on each. These are small details all apt to be neglected, yet they mean much time saved in the aggregate and involve only a trifling expense.

A small manufacturer in another eastern city found his trucks seriously hampered by delay in loading. The nature of his business was such that it was impossible to make up his loads in advance and to have them waiting for the truck. He could not afford to maintain more than two loaders. These men, work as they would, could not load the trucks fast enough. He accordingly arranged to turn the whole packing and boxing squad onto the loading platform at loading time, taking but little of each man's time, yet saving a very expensive delay to his rolling stock.

(Continued from column 2, page 52)

iently. They are well made and will stand vibration. They are of ample capacity and of sufficient number. The brakes are accessibly placed. Their working parts are large and well bushed. The same may be said of typical American brakes, but we must give the palm to the foreigner when it comes to ease of adjustment. Brakes are adjusted as easily on their trucks as we may adjust a steam valve. No tools are needed, and when the adjustment is made it stays that way until another turn is given to the adjusting wheel. It is not necessary to crawl in the mire to reach these adjustments, nor to remove any other parts. Very few nuts will be found on these chassis that are not either cotter-pinned, wired, or provided with lock washers.

From the dealer's standpoint, little things are often very big things. Buyers are quite as susceptible to impressions gained from details as from essentials. A little care in the design of a cab, a dash or a radiator, with an eye to appearance, very often so tones up the whole aspect of the vehicle that its apparent value is enhanced. Often, too, an excellent piece of mechanism will be condemned in the necessarily hasty examination of the purchaser because some details has been slighted.

An experienced buyer especially appreciates grease cups that look and feel the part, hardware on the hood fastenings, cab and dash that feel firm and have character, mud pans that really protect the motor and yet which can be dropped quickly and easily without having to fuss with mud-caked screws and nuts.

An instruction plate, placed prominently and containing real counsel of value, couched in direct, easily-understood language inspires more confidence than all the service bromide a salesman is capable of quoting. A competent outfit of tools, with a good place to keep them does not cost much, and has a psychological effect not to be forgotten.

From hence forward the industry, for some years at any rate, will not again witness such sharp revolution in chassis design as in the 2 years past. Those who turn the same searching, practical eye upon details that has been cast on essentials so lately, will be the ones who will occupy the pages of truck history in years to come.

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## Republic 3-tonner Has Steel Disk Wheels

CHARACTERISTIC of Republic practice is the new 6,000-pound model recently brought out by the Republic Motor Truck Co., Alma, Mich. It is characteristic because it employs an internal-gear-driven rear axle with the Hotchkiss torsion and propulsive system and a unit power plant. It is particularly interesting in that it uses steel disk wheels, of cast construction, these wheels being especially adapted to the internal-gear form of drive because of the solid web with which the brake drum, which carries the internal-gear ring, is integral.

The truck has its motor under a hood of the characteristic Republic shape and left steer and central levers. The price is $2,400 for the chassis with the option of from 165- to 185-inch wheelbases. The steel wheels, supplied by the Buchannan Electric Steel Co., Buchannan, Mich., carry 36 by 5-inch tires, front and rear, those behind being dual.

The motor is a Buda, 4½ by 5½, rating 29 formula horsepower. It is block-cast and governed by a Kramer suction governor to 11 miles per hour. With its 11 to 1 gear-ratio on high, this speed is reached at 1,300 r. p. m. The motor has three bearings and the valves are to the right, their mechanisms inclosed beneath a single aluminum cover.

Cooling is effected by centrifugal pump circulation through a finned-tube vertical radiator, cased in sheet brass. A Stromberg carbureter is used. Ignition is supplied on the single plan by a Bosch magneto with hand-advanced spark.

The unit power plant embraces with the motor a dry-disk clutch and four-speed selective gearset built by the Muncie Gear Works, Muncie, Ind. Direct drive is afforded in high gear, the ratios being 39.6 to 1 in low, 22.7 in second, 14.5 in third and 11 in high. Reverse is at 42.9 to 1.

From the gearset the drive is taken by a two-part shaft with three universals, the middle portion being supported by a bearing mounted on a cross-member. A Celfor axle is used, comprising an I-beam load-carrying member and a built-up cast-iron jackshaft of rigid construction, mounted in front of the axle. Sheldon springs are used, these being of generous width, perched above the axle and the rear ones pivoted at their front ends in heavily-reinforced brackets hooded over the top.

Brakes are all on the rear wheels, the hand brakes internal and the foot brakes external, on the same drums. The frame is of pressed steel with six cross-members, integral front spring horns and heavy gussets in the rear corners.

Other Republic models are of ¾, 1 and 2 tons capacity, all internal-gear driven.

## Stewarts Have New Motor Location and Drive

PRACTICALLY re-designed, the product of the Stewart Motor Corp., Buffalo, N. Y., for 1916 shows two radical changes from the construction followed in these vehicles in past years. The French hood, with the radiator on the dash, has given way to the conventional box type of hood with the radiator in front. The bevel drive, formerly employed, has been changed to the internal-gear form, with a slight reduction in gear-ratio on the ¾-ton model. There are three Stewarts this year, of ½-, ¾- and 1¼-ton capacity, similar except that the ¾-tonner is offered with the option of bevel drive if slightly higher speeds are desired, but the Stewart company insists that pneumatic tires be used in this event. Pneumatic tires are standard on this size, but solids may be fitted if desired. The features of the three models are:

| | | | |
|---|---|---|---|
| Capacity, pounds | 1,000 | 1,500 | 2,500 |
| Price | $695 | $1,250 | $1,350 |
| Wheelbase | .... | 118-128 | 128 |
| Tires, front | 32x4 | 34x4½ | 35x3½ |
| rear | 32x4 | 34x4½ | 35x4 |
| Drive | —— | internal-gear | —— |

All models have their motors incorporated into unit power plants with their three-speed selective gearsets and dry-plate clutches, and hung directly from the frames. Following are brief specifications of these motors:

| | | | |
|---|---|---|---|
| Capacity, pounds | 1,000 | 1,500 | 2,500 |
| Bore | 3 | 3½ | 3½ |
| Stroke | 4¼ | 5¼ | 5¼ |
| N. A. C. C. hp. | 14.40 | 19.61 | 19.61 |
| Speed, r. p. m. | .... | 1,500 | 1,500 |
| m. p. h. | .... | 25 | 20 |

They are all cast in block, valves on the ½-tonner being in the head and those on the others to the right. Water circulation is by thermo-syphoning through cellular, sheet-metal-incased radiators and Zenith carbureters are used. No governors are fitted. Bosch single ignition with fixed spark is employed.

Clutches are of the dry-disk type and gearsets afford three speeds. Final drive on each model is by single double-jointed shafts to the Celfor axles, springs taking both torsion and propulsion.

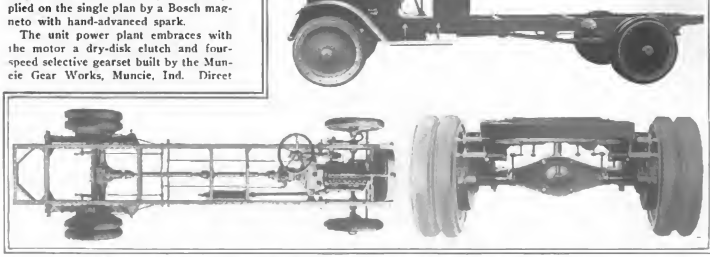

Fig. 1—New 3-ton Republic chassis, whose features include internal-gear drive, a unit power plant and steel disk wheels. Above, it is shown in profile, the top view is shown to the left, and to the right, a rear view showing heavy Celfor rear axle

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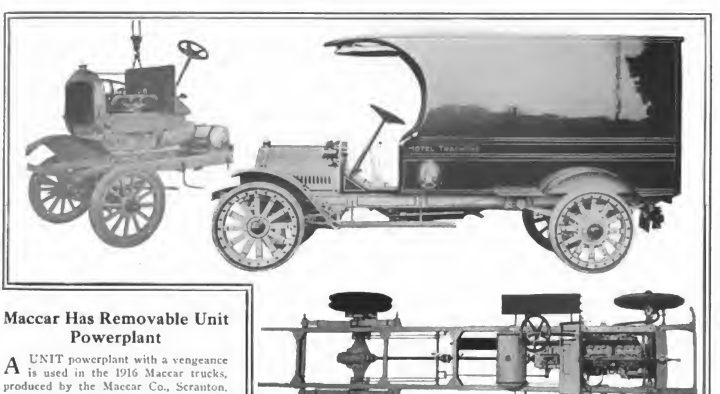



Fig. 2—The 2-ton Maccar in profile and plan, showing lay-out of worm drive. Insert shows the Mueller unit powerplant being lowered into place on a chassis

## Maccar Has Removable Unit Powerplant

A UNIT powerplant with a vengeance is used in the 1916 Maccar trucks, produced by the Maccar Co., Scranton, Pa. The power plant is known as the Mueller and comprises not only the motor, clutch and gearset, but the radiator, dash, footboards, steering gear, levers and pedals, all in one compact unit, supported on two short side cradles, which fit inside the frame in front, in the usual location. By disconnecting the drive-shaft, the steering rod, the gasoline line and the brake pull-rods, and taking out six bolts, a steel bail may be attached to permanent fastenings on the inside of the side cradles and the entire unit hoisted from the chassis.

Fig. 3—The Lombard tractor-truck, giving a good idea of the creeper construction

Maccar chassis are made in both chain- and worm-driven types, to both of which the Mueller unit is applied. The capacities are 1, 2 and 3½ tons, as follows:

| | | | |
|---|---|---|---|
| Capacity, pounds | 2,000 | 4,000 | 7,000 |
| Price | $2,700 | $2,600 | $3,200 |
| Wheelbase | 136-150 | 150-162 | 162-174 |
| Tires, front | 36x4 | 36x4 | 36x5 |
| rear | 36x5 | 36x4d | 36x5d |
| Final drive | worm or chain on option | | |

The motors used are of Continental manufacture, in two sizes, as follows:

| | | |
|---|---|---|
| Capacity, pounds | 2,000 | 4,000 & 7,000 |
| Bore | 4¼ | 4½ |
| Stroke | 5½ | 5½ |
| N. A. C. C. hp | 27.20 | 32.40 |
| Speed, r. p. m. | 1,000 | 1,000 |
| m. p. h. | 16½ | 13—11 |

Brown-Lipe dry-disk clutches and three-speed selective gearsets are employed, and the drive is taken through divided shafts with three universals to Timken-David Brown worm-driven axles or Timken jackshafts and side chains. On the worm-driven models Hotchkiss drive is employed. All models have left steer and central levers.

Fig. 4—Stewart 1,000-pound model, showing new form of hood and pneumatic tires

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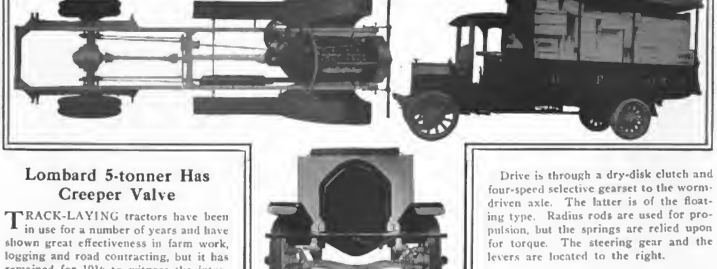

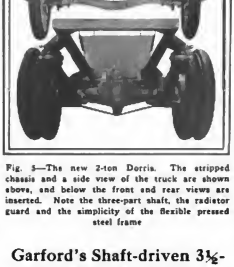

Fig. 5—The new 2-ton Dorris. The stripped chassis and a side view of the truck are shown above, and below the front and rear views are inserted. Note the three-part shaft, the radiator guard and the simplicity of the flexible pressed steel frame

## Lombard 5-tonner Has Creeper Valve

TRACK-LAYING tractors have been in use for a number of years and have shown great effectiveness in farm work, logging and road contracting, but it has remained for 1916 to witness the introduction of the creeper drive to motor trucks. The Lombard vehicle, which was developed for logging work in Waterville, Me., is now being manufactured by the Lombard Auto Tractor-truck Corp., New York city.

It is to all intents and purposes a powerful 5-ton truck with sufficient reserve power to negotiate severe grades and to haul heavy trains of trailers. The essential difference is that instead of the usual rear axle, wheels and springs, two creeper drive units are substituted. These comprise endless chains, shod with steel feet or blocks, running over large sprockets and supported by annular rollers, bearing on a pivoted pedestal within the chain oval.

The sprockets are mounted directly on the frame of the truck in large outboard journals. Each is carried on a shaft, extending across the full width of the frame, the rear shaft an idler shaft and the front one a live axle, worm-driven as in a motor truck. These shafts and sprockets carry none of the load, but merely turn the chain about. The pivoted pedestal is triangular in shape, the pivot being at the apex and journaled to the frame, while the base is a flat surface. This pedestal takes all of the load, and being pivoted is free to adapt itself and the chain under it to the road.

The annular rollers are carried on a secondary chain, running on its own sprockets, freely bushed on the main sprocket shafts. They are at all times interposed between the base of the pedestal and the flat track on the inside of the main chain. This gives a firm support with the minimum of friction, no turning parts being subjected to load except the rocking pivot of the two pedestals.

The rest of the vehicle is similar to standard practice, having a four-cylinder 6 by 8 pair-cast motor under a hood with dual ignition, hand controlled, and a centrifugal governor to limit the speed to a maximum of 6 miles per hour at 1,400 r. p. m. A disk clutch takes the drive through a three-speed gearset, from whence a short shaft leads to the worm-driven front jackshaft.

There are no springs, as the vehicle never exceeds 6 miles per hour. Flexibility is afforded by a pivoted front axle.

## Garford's Shaft-driven 3½-tonner Conservative

CONSERVING the motor-between-seats construction which has always characterized Garford vehicles, the worm-driven 7,000-pounder differs but little from the heavy chain-driven Garfords. From the driver's seat forward the truck is practically identical in construction with the 2-, 3- and 4-ton chain-driven models of previous years and the chain-driven 5- and 6-tonners for 1916. The price is $3,400, $100 less than last year's 3-tonner, and wheelbases from 128 to 150 inches are offered. Tires are 36 by 5 in front and 40 by 5 dual in the rear.

The motor is placed between the seats, under a hood, with the radiator mounted on the curved-front Roman dash which is used on all Garford trucks. This motor is 4¼ by 5½, rating 29 horsepower by formula. It is cast in block and has three bearings, the valves being to the right. Centrifugal pump circulation through a cellular radiator cools it and a Splitdorf Dixie magneto in a single system provides ignition. A suction governor is employed, limiting the speed to 956 r. p. m., or, with the 10.3 to 1 gear-ratio in high, 11¼ miles per hour.

Drive is through a dry-disk clutch and four-speed selective gearset to the worm-driven axle. The latter is of the floating type. Radius rods are used for propulsion, but the springs are relied upon for torque. The steering gear and the levers are located to the right.

## Dorris Motor in 2-ton Shaft-Driven Truck

FEATURING especially the valve-in-head unit powerplant manufactured by the Dorris Motor Car Co., its 2-ton 1916 commercial model differs from that of a year ago in that worm drive has been substituted for chain drive. The ¾-ton model is continued practically as before, except that the price has been reduced $50.

The two Dorris models both have their motors located under hoods forward of the dash, and both have pressed steel frames. The lighter size is mounted on pneumatic tires and the heavier on solids. Their specifications are briefly given below:

| | | |
|---|---|---|
| Capacity, pounds | 1,500 | 4,000 |
| Price | $1,900 | $2,500 |
| Wheelbase | 132-144 | 144-162 |
| Tires, front | 36x4½ | 36x4 |
| rear | 36x4½ | 36x4d |
| Drive | bevel | worm |

The Dorris unit powerplant incorporates the motor and gearset by means of arms encircling the flywheel, which is exposed and houses the clutch. The feature of the motor is the valves, which are in the head, operated from the camshaft by push-rods and rocker-arms. The same motor is used in both models. Its features are:

| | | |
|---|---|---|
| Capacity, pounds | 1,500 | 4,000 |
| Bore | 4⅜ | 4¾ |
| Stroke | 5 | 5 |
| N. A. C. C. h. p. | 30.65 | 30.65 |
| Speed, r. p. m. | 1,143 | 1,085 |
| m. p. h. | 30 | 15 |

The cylinders are cast in pairs, and the crankshaft runs on three bearings. Water circulation is effected by a centrifugal pump, the fan being cast in the web of the flywheel. It is cooled by a cellular radiator, inclosed in sheet brass on the smaller model and by a built-up casing partly cast and partly of sheet metal in the 2-tonner.

Stromberg carbureters are fitted, the ¾-ton model being without governor and

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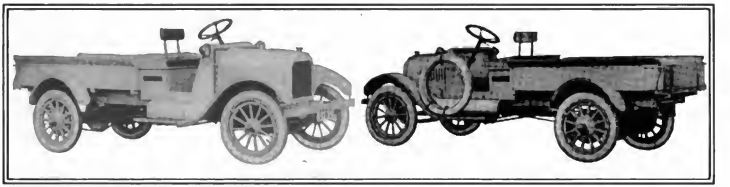

Fig. 6—Old Hickory of 1,250 pounds capacity, the first of this line with its motor under the hood. Note pneumatics, all the same size with an extra rim and tire as stock equipment. Note also bumper, integral with the frame

the 2-tonner fitted with a motor-driven centrifugal type.

Electric starting and lighting is supplied on the 1,500-pound model and so the Westinghouse generator and the storage battery used for this purpose are also called upon to furnish current for the ignition, which is dual, a dry-cell reserve being used. On the 2-tonner a Bosch magneto is used, likewise in a dual system with dry-cell reserve. In the latter the spark is hand-advanced, but in the larger there is a governor to advance it part way and a hand adjustment of the governor.

The clutch is a dry-disk pattern and the gearset a three-speed selective unit. Like the motor, both clutch and gearset are made in the Dorris factory. The rear axles, however, of both models are Timken products, of the floating type. Spring torque and propulsion are used on the 2-tonner, but a torque arm is used on the lighter model. The Sheldon springs are semi-elliptic all around except in the rear of the ⅜-ton size, which has a platform suspension.

## Phoenix Centiped, a Track-laying Truck

CREEPER drive is the feature of the 5-ton vehicle produced by the Phoenix Mfg. Co., Eau Claire, Wis. The vehicle is a 5-ton truck with track-laying drive units instead of rear wheels, and unlike most other creeper-driven vehicles, it is spring-mounted.

The creeper units are carried on two large sprockets each. These sprockets are carried by a rigid oval casting with smooth flanges at its periphery. This casting is pivoted at its center to an axle, laid across the truck frame and suspended from it by coil springs. The chains are carried by the end sprockets, the forward pair of which are driven by internal gearing. The weight is carried by an annular roller chain, which is interposed between the chain and the flanged edges of the carrying casting. This pivotal mounting of the creepers permits them to assume any angle necessary to negotiate the road surface and the flexibility of the chassis is remarkable. The front axle is pivoted at its center, and likewise suspended on coil springs.

The frame is of rolled channel steel, carrying a 5½ by 7-inch four-cylinder Model motor under the hood, the valves of which are at the right and in the head. It is cooled by centrifugal pump circulation through a square-tube radiator. Ignition is supplied by a Swiss single magneto, hand-advanced. A centrifugal governor limits the speed to 700 r. p. m., or about 5 miles per hour.

An expanding-shoe clutch drives a constant-mesh individual-clutch Cotta gearset mounted as a unit with the jackshaft. This affords three forward speeds and one reverse.

The front wheels are of steel, 42 by 10.

## Old Hickory Recruits a 1,250-pounder

SINCE adding gasoline trucks to its line of electric trucks under the Urban and Old Hickory trade-marks, the Kentucky Wagon Mfg. Co., Louisville, Ky., has perceived the demand for a lighter vehicle than the original 1½-ton Old Hickory gasoline truck. The result is the production of a new model of 1,250 pounds capacity. The new model differs from former types in that it has its motor under the hood instead of under the floorboards. It is mounted on elliptic rear springs, has pneumatic tires and drives through straight bevel gears.

Its motor is a 3¼ by 5 Lycoming, incorporated with a clutch of the same manufacture and a Grant-Lees three-speed selective gearset. This motor has its valves to the right and is thermo-syphon cooled. It runs on two bearings and is rated by formula at 16.92 horsepower.

A storage battery furnishes ignition current on the Connecticut system, spark advance being hand-controlled. Propulsion and torque from the Salisbury rear axle is taken by a torsion tube surrounding the driveshaft and yoked to the frame. The vehicle is fitted with a pressed steel frame, the forward portion of which is extended sideways to form a substantial bumper. The cab is of steel with a cowl dash and the fenders are well-made and neat in appearance. The tires are carried on demountable rims, one extra rim and tire complete being supplied with each truck. A bracket on the left running board carries the spare. Electric lights are mounted on the dash, supplied from the same battery which furnishes ignition.

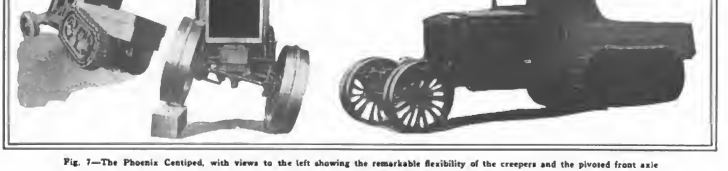

Fig. 7—The Phoenix Centiped, with views to the left showing the remarkable flexibility of the creepers and the pivoted front axle

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# Bodies for Diversified Classes of Work

## Revolving Coal Body; Types for Bus, Tin Cans and Timbers

### Municipal Truck With 18-Foot Body for Pipes

DESIGNED for hauling long pipes and timbers used in the construction work of the New York City Department of Docks and Ferries, the 3-ton Sternberg truck shown in Fig. 1 has a special wheelbase of 192 inches with a body 18 feet long. The truck follows standard Sternberg construction in every particular except the wheelbase. It is not, however, the longest wheelbase truck which its maker, the Sterling Motor Truck Co., Milwaukee, Wis., has built, for it has sold several 208-inch wheelbase 3-tonners for use by box and shook manufacturers.

The extreme length of body, 18 feet, or 216 inches, 24 inches greater than the wheelbase of the truck, was more easily obtainable on a truck of the motor-under-the-floor type than on one with its motor under a conventional hood forward of the dash.

The extreme wheelbase has made it necessary to reinforce the frame, this being done by four strut rods with turnbuckles, as shown in Fig. 1.

The body is of the stake-sided type, the stakes on each side being made into two 9-foot sections, each of which may be removed as a unit to facilitate side loading or unloading. This is of great convenience where the streets are so narrow that backing the truck up against the curb would interfere with traffic.

### Monster Body for Carrying Empty Tin Cans

CHARACTERIZED by its monster size, the body shown mounted on the 5-ton Saurer chassis in Fig. 2, was designed to enable the truck to carry a capacity load of empty tin cans. The latter are very light, yet bulky, and 5 tons of them required a body 15 feet long, 7 feet wide and 7 feet 2 inches high. It is constructed of wood with shallow side panels, side slats 7 feet 2 inches high and a slat top. The side panels are 30 inches high and are lined on the inside with 20-gauge sheet iron. The tailboard, which is of the same height as the side panels, is also lined with sheet iron.

The floor of the body is covered with iron strips, set into wood, so that in loading, the cans can be slid along the floor from the tailboard to the front end. The sides, ends and top of the body are reinforced with angle irons to give the structure greater rigidity.

In fair weather, the body is open on sides, ends and top, as shown in Fig. 2. In stormy weather, one large tarpaulin, sufficient to cover the whole, is used to prevent snow or rain from getting into the cans and rusting them. The tarpaulin, when not in use, is carried in the open-ended, trough-shaped shelf attached to the front end of the body, above the top of the driver's cab.

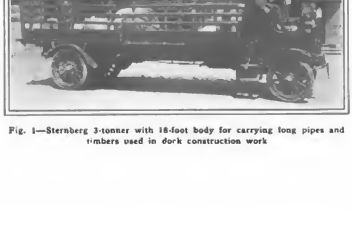

Fig. 1—Sternberg 3-tonner with 18-foot body for carrying long pipes and timbers used in dock construction work

Fig. 2—Monster body on 5-ton Saurer for loads of empty tin cans

The body is carried on wood side sills sufficiently high to place the floor at such a distance above the rear wheels of the truck, that no under-cut wheel housings are necessary. This construction enables the full width and length to be used for the load.

The truck is owned by the American Can Co., New York City, and is used to carry empty tin cans between the company's plants in New York City and Brooklyn and to deliver them to canning concerns in the Metropolitan area and to the various wharves along the riverfronts for shipment by boat.

### Revolving Body Dumps at Side or Rear

DUMPING at either side or at the end, as occasion makes necessary, the body shown in Fig. 3 is mounted on a special sub-frame carried on a ball-bearing turntable placed on top of the truck frame. This mechanism is the means whereby the body is revolved to one side or the other, as desired, while the elevation of the front end is accomplished through a train of gears, and cables carried on a vertical upright pivoted at the bottom to the front end of the body sub-frame. This upright moves with the sub-frame when the latter is revolved about the turntable and when the body is at right angles to its ordinary position, both frame and upright extend beyond the truck frame for about 2 feet.

The body is shown in Fig. 3 and was made by Lawrence Bruder, Cincinnati, O. It is mounted on a 3-ton Standard chassis owned by the Miller Supply Co., Duquesne, Pa.

It is of wood with an inner lining of sheet metal on the bottom. The sub-frame is of wood, reinforced with steel plates held in place by bolts clear through the wood. The body is pivoted to the sub-frame by means of bolts through holes in two brackets on the body, one on each side, at a point about 18 inches from the rear end.

The sub-frame is mounted on a fifth-wheel somewhat similar to the conventional types used on most horse wagons except that in place of the flat sliding surface of contact in the latter, the former has a ball-bearing contact. This enables one man to swing the body, with its full load, clear around to a position at right angles to the center line of the truck

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in about 10 seconds. This is done by means of a long steel rod with a handle on one end and a hook on the other.

When the body is in position to dump on either side, but not elevated, its weight and that of the load is evenly distributed on both rear tires. As soon as the body is elevated, the center of gravity of the body and load moves toward the rear, so that at the minute the load is dumped the tires on the dumping side bear more weight than those on the other. This difference is slight and is in effect for such a short time that it is not calculated to damage either truck or tires.

The elevating mechanism consists of a vertical frame mounted on the front end of the body sub-frame. The vertical frame is made up of two uprights slightly bottle-necked at the top and suitably braced by crosswise members. A train of six gears is carried between the two uprights on four shafts, the ends of which are inserted through the uprights. The upper gear shaft carries two small drums, one near each end, around which are wound chains attached to the under side of the body near its front end. From the drums, the chains pass over two small pulleys at the top of the frame and thence down under two other pulleys on the bottom of two arms pivoted to the bottom of the body at the extreme front end.

From there two other chains are used to points beneath the body about 18 inches aft of the pivoted arms. The use of the pivoted upright and the pivoted arms permits of a longer body with the same overhang, because the arms remain nearly vertical while the body is being raised and do not tend to foul the upright as they would if fixed perpendicular to the body bottom.

The body is elevated by setting the train of gears in motion by means of a crank handle slipped over the end of the shaft of the first gear in the train. This shaft extends through the uprights on either side, so that in dumping on either side the driver may stand on the ground at the side or rear of the truck to turn the crank.

In side dumping, the body is first revolved to the proper position and then elevated. This operation and the dumping of the load takes about 3 minutes, including bringing the body back to its original position. A load may be dumped from the end in about 2 minutes' time.

When the truck is carrying its load from point to point, the body is locked in position by means of a pivoted arm carried on the left side of the sub-frame, near the front. When the body is to be turned, this arm rests horizontally on a small lug attached to the sub-frame, aft of the pivot point. To lock the body in position the arm is revolved up and then around to a vertical position below the pivot, where it bears against an offset lug bolted to the side of the wood sill mounted on top of the truck frame.

Fig. 4—Twenty-eight passenger bus body on 2-ton Adams chassis

## Twenty-eight Passenger Bus on 2-Ton Chassis

CARRYING twenty-eight passengers, an overload of 200 pounds, assuming each passenger to weigh 150 pounds, the bus body shown in Fig. 4 is mounted on a 2-ton truck chassis made by the Adams Truck Foundry & Machine Co., Findlay, O. It is equipped with a fifth spring at the rear and ½-inch wider rear tires in order to take care of the excess load carried when the bus has its full quota of passengers.

The passengers are carried on seven crosswise seats, each accommodating four persons. The space between the seats is open at each side, thus permitting passengers to enter or leave on either the right or left side as is most convenient.

A permanent canopy top with side curtains protects the passengers in inclement weather.

Access to or egress from the seats is had by means of a running board on each side from the front fender clear back to the rear crosswise seat. In the way of the rear wheel and the jackshaft sprocket and driving chain, each running board is stepped up to a level with the floor of the body, as shown in Fig. 4. The seats in the way of this step-up are entered by first standing on the lower portion of the running board and then on the upper part, flush with the body floor. The lower portion of the step is 18 inches from the ground, and the body floor 38 inches from the ground or 20 inches above the step.

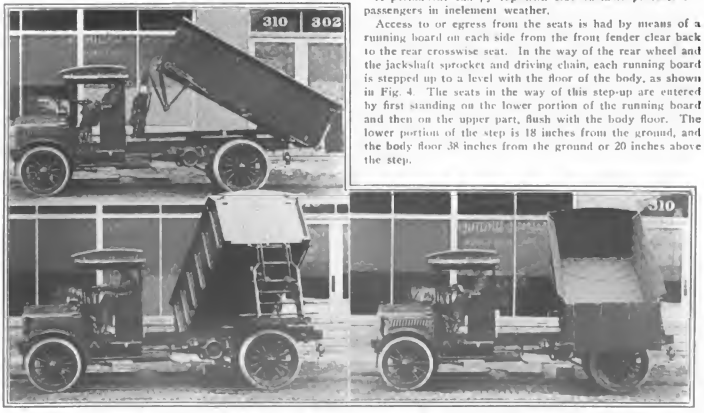


Fig. 3—The Lawrence Bruder revolving dump body, shown in position for side and rear dumping

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# Men and Makers

**BROCKWAY MOTOR TRUCK CO.,** Cortland, N. Y., is now receiving bids for the erection of a new plant, two stories high, 40 by 186 feet.

**Pierce-Arrow Motor Car Co.,** Buffalo, N. Y., has just let a contract for the erection of a laboratory and experimental building, 50 by 90 feet, two stories, at its plant at Elmwood avenue and the New York Central railroad tracks.

**Willys-Overland, Inc.,** has just been organized under the laws of Virginia with a capital of $500,000 to take over the sales department and handle the sales of the entire product of the parent company, the Willys-Overland Co., Toledo, O. All the stock of the new company will be owned by the parent company and all of its officers and directors are from the official staff of the Toledo concern. The officers are: John N. Willys, president; H. L. Shepler and C. A. Earl, vice-presidents; Walter Stewart, treasurer, and R. R. Scott, secretary.

**Duplex Power Car Co.,** Charlotte, Mich., maker of the Duplex four-wheel-driven truck, is adding more machinery to its plant equipment in order to enable it to keep apace of its orders. Further enlargements of the plant are also contemplated.

**G. A. Schacht Motor Truck Co.,** Cincinnati, O., is moving its plant from Spring Grove avenue to the manufacturing building at Gest and Evans streets. The quarters to be occupied in the latter building will increase the Schacht company's manufacturing facilities.

**Larrabee-Deyo Motor Truck Co.,** Binghamton, N. Y., a new concern recently formed in that city for the manufacture of motor trucks, completed arrangements at a recent meeting of its stockholders to lease a portion of the main building of the Sturtevant-Larrabee Co. as a plant to make its vehicles.

**Detroit Steel Products Co.,** Detroit, has just moved into its third new building started last year. It was not completed in time to meet the demand of increased orders for motor vehicle springs, so that the company had to install its additional heat-treating furnaces in it before it was completely inclosed. The addition of the three new buildings of 1915 has enabled the company to increase its spring production sevenfold since January 1, 1915.

**Fuller & Sons Mfg. Co.,** Kalamazoo, Mich., manufacturer of motor vehicle gearsets and clutches, is rushing to completion its new building made necessary by the large increase in its domestic orders. The new structure is of steel and concrete construction with large steel-sashed windows.

**Toledo Machine & Tool Co.,** Toledo, O., has recently been bought by Hoit, McWilliams & Co., New York City, for clients. The Toledo company is capitalized at $6,000,000. Its stock was recently increased through the distribution of a 400 per cent stock dividend. Heretofore the company has specialized in the manufacture of machinery for making sheet-metal products.

**Syracuse Malleable Iron Casting Co.,** 101 Geddes street, Syracuse, N. Y., is erecting three buildings of steel, brick and concrete at a cost of approximately $100,000. Each building will be 110 by 350 feet and will be equipped with the latest and most modern machinery, ovens and furnaces, suitable for the production of malleable iron castings.

**Mutual Wheel Co.,** Moline, Ill., formerly manufacturer of wagon and buggy wheels, has taken out a permit for the erection of a four-story building for the manufacture of motor vehicle wheels. The new structure will be of brick and is estimated to cost $10,000.

**Fitzsimmons Steel Products Co.,** Milwaukee, Wis., a subsidiary of the Fitzsimmons Steel & Iron Co., Chicago, has broken ground for a new steel finishing mill and power house in the Menomonee valley at Milwaukee. The plant will be used exclusively for the production of cold-drawn steel products. It will be 105 by 200 feet on a plot 200 by 275 feet, fronting on both the canal and the railroad tracks. Carl and Ernst Prinz of Milwaukee are among the principal stockholders.

**Milwaukee Auto Engine & Supply Co.,** Milwaukee, Wis., has just awarded contracts for the erection of its new factory at Twenty-eighth street and Meinecke avenue in that city. The building will be of fireproof brick and steel construction, 60 by 120 feet. It will be partly one story and partly two stories high and will have a large electric elevator.

**Bosch Distributors' Convention** was held at the advertising department of the Bosch Magneto Co., at 1764 Broadway, New York City, on December 30 last. Business sessions were held both morning and afternoon. A banquet was served in the evening. The following day the entire party made a trip *en mass* to the Springfield, Mass., factory of the Bosch company, where it saw how the Bosch products are made. Thirty-six distributors from all over the United States were in attendance.

**American Chain Co.,** Bridgeport, Conn., is the new name of the Weed Tire Grip Co. The American company, while practically identical with the Weed company, was formed several years ago to establish a distinct manufacturing department to deal with production problems. But with the completion of the latter's new factory, the consolidation toward which the two companies have been working will be made effective. There is to be no change in personnel, management, policy or product.

**American Rotary Valve Co.,** Anderson, Ind., has discontinued the manufacture of electric motors, press drives and vacuum cleaners and will concentrate on its Arvac universal joint for motor vehicles. Repair service on the discontinued products will be continued. The change in manufacturing policy does not involve any modification in the company's ownership or management.

**H. T. Sigwalt,** advertising manager of the Federal Motor Truck Co., Detroit, has resigned. He has been succeeded by George W. Cushing, of the Detroit Board of Commerce and editor of the *Detroiter*, the board's weekly paper.

**Master Calorite** is the new name of the Master spark plug manufactured by the Hartford Machine Screw Co., Hartford, Conn. The company has adopted a new

Stationed at the Dallas, Tex., branch of Sears, Roebuck & Co., Chicago, the largest mail-order house in the world, the two Wichita trucks shown in the above illustration together carry more than 2,000 sacks of mail daily. They operate between the branch house and the local post office and railroad freight station. On the trips from the plant, the trucks carry parcel post mail to the post office, advertising matter such as catalogs, etc., to the same point or freight shipments to the local railroad shipping platforms. On the return trips from the post office they carry the incoming mail which is of considerable quantity due to the nature of the business of the company

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On the Colorado desert! A Holt motor-driven caterpillar traction engine used by Riverside County, Cal., in the building of the latter's share of the great new road to Imperial and Yuma. At the present time the road is finished as far as Palm Springs, out on the Colorado desert. The tractor is shown hauling five loaded four-wheeled trailers with a total burden of 15 tons of crushed stone. In that country 1 ton is considered a good load for a two-horse wagon

insulating material known as calorite which is claimed to be unaffected by an instant change in temperature of 2,300 degrees and which is also fracture proof. The material is a special composition, somewhat similar in appearance to porcelain.

**Vincent Link**, former chief engineer of the Universal Motor Truck Co., and until recently with the Packard Motor Car Co. as engineer in the truck department of that company, has joined the J. C. Wilson Co., maker of the Wilson 1-ton truck. He will be consulting and designing engineer for the Wilson company and will immediately begin the design of a new 2-ton truck to be brought out by that company. He succeeds G. E. Porter at the Wilson plant.

**G. E. Porter**, formerly designing engineer of the J. C. Wilson Co., Detroit, will identify himself with a new motor truck company being organized in Detroit for the manufacture of a ¾-ton truck. It is said that he will have a substantial interest in the new concern.

**J. G. Culbertson and Frank Kell**, respectively general manager and vice president of the Wichita Falls Motor Co., Wichita Falls, Tex., sailed from New York on the *New York* of the American Line on December 31 for England. They have gone abroad to arrange for the sale of Wichita trucks in the countries of the Allies.

**J. T. Bowman**, director of sales for the Federal Motor Truck Co., Detroit, has just returned to the Detroit plant from a 6-weeks trip through the west where he made a study of business conditions, especially in California. He reports that business conditions are specially good in California.

**Charles P. Case**, in charge of the exhibit of the Federal Motor Truck Co., Detroit, at the Panama-Pacific Exposition at San Francisco, has just returned to Detroit. Mr. Case brought with him the gold medal and banner awarded the Federal trucks shown.

**Seymour de Bennerville Keim** has been appointed manager of the New York City branch of the Locomobile Co. of America, Bridgeport, Conn., succeeding J. F. Plummer, who resigned a few weeks ago as manager of the same branch to assume other business interests. Mr. Keim has been manager of the Philadelphia branch of the Locomobile company for several years. He will be succeeded there by Arthur P. Hawes, at present manager of the Boston, Mass., branch of the Locomobile company.

**F. J. Pardee** has just been appointed sales manager of the Diamond-T Motor Truck Co., Chicago. That company has recently increased its production facilities and will hereafter offer its trucks for sale all over the United States.

**R. L. Wilkinson** has been appointed general manager of the factory of the Blair Motor Truck Co., Newark, O. R. C. Hammond was also elected secretary and treasurer of the same company. Mr. Wilkinson was formerly identified with the organization of the B. F. Goodrich Co., Akron, O.

**H. A. Conlin**, until recently a salesman for the Boston, Mass., and Providence, R. I., branches of the Federal Motor Truck Co., Detroit, has been appointed sales manager of the Federal company in the middle west.

**E. D. Jones**, southern district manager of the Federal Motor Truck Co., Detroit, with headquarters in Atlanta, Ga., has just returned to the plant in Detroit. He reports that the business conditions in the south are much improved and that the Southerners are not depending upon cotton alone but are raising other crops which will require a greater number of trucks for their handling..

**J. L. Glazier**, representative of the Federal Motor Truck Co., Detroit, on the Pacific coast, has made arrangements with the Wichita Falls Motor Co., Wichita Falls, Tex., to handle the latter company's line of motor trucks in the same territory. He will make his headquarters in Portland, Ore. Before agreeing to handle the sales of Wichita trucks, Mr. Glazier visited the factory in the Lone Star state.

**G. M. Montgomery** has been appointed eastern traveling representative for the Standard Motor Truck Co., Detroit.

**George W. Gaidzik**, representative of the Thomas B. Jeffery Co., Kenosha, Wis., in South America, and who recently returned to the United States and reported favorable conditions for the sale of Jeffery four-wheel-driven trucks there, sailed from New York on January 9 with has family for Buenos Aires, Argentina, where he will make his headquarters temporarily.

**Daniel C. Swander**, formerly branch manager of the New York City office of the Firestone Tire & Rubber Co., Akron, O., now has charge of all business in the eastern territory. He will be succeeded by C. D. Studebaker.

**H. B. Niblette**, general manager of the Buffalo, N. Y., branch of the B. F. Goodrich Co., Akron, O., has resigned. His resignation took effect on January 1. He had been with the Goodrich organization for 17 years, the first 11½ years as a salesman out of the New York City branch. Mr. Niblette will temporarily make his headquarters at the Knickerbocker hotel, New York City. Definite announcement of his future plans has not yet been obtained.

**E. W. DeSaw**, formerly manager of the Des Moines, Ia., branch of the Firestone Tire & Rubber Co., Akron, O., is now in charge of all the western branches of the Firestone organization. He is succeeded as branch manager by G. A. Spohr, formerly a salesman in the same branch.

**N. B. Burwell**, of the home office sales force of the Firestone Tire & Rubber Co., Akron, O., has just been placed in charge of all the southern branches of the Firestone company.

**Thomas Snelling**, manager of the Minneapolis, Minn., branch of the Stewart-Warner Speedometer Corp., Chicago, has just been appointed manager of the Indianapolis, Ind., branch of the same company, succeeding L. L. Sanford, resigned.

**Employes of the Timken-Detroit Axle Co.**, Detroit, received between $12,000 and $14,000 as Christmas bonuses.

**Federal Motor Truck Co.'s Employes' Bonuses**, given as Christmas presents, varied from 5 to 10 per cent of the employes' yearly salary. Those on the company's payroll for 1 year or more received the 10 per cent present; those with the company for 9 months to a year, 7½ per cent, and those with the company from 6 to 9 months, 5 per cent. According to Vice President M. L. Pulcher, the bonus system has produced excellent results in that it has reduced the number of employes leaving the company during the year. The number of

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employes who had been with the company during all of 1915 was 15 per cent greater than the number with the company continuously during 1914.

**Eisemann Magnetos Will Be Used on 1916 White Trucks**, the Eisemann company having just begun deliveries on a contract made some months ago with the White Co., Cleveland, O., for Eisemann type G4 magnetos to be used exclusively as standard equipment on White trucks for the coming year.

**Largest Single Order for Micro Piston Rings**, made by the Micro Piston Ring Co., New York City, is said to have been placed at the recent New York show by Charles E. Miller, the accessory dealer. The order covers the requirements of all the Miller stores in various cities throughout the United States for 1916. The Micro rings are of the two-part type.

**The Akron, O., Garage Owners' Assn.** was perfected at a meeting held at the Portage hotel last week when officers were elected as follows: Andrew Ayale, president; G. R. Funk, vice president; Enoch T. Jones, secretary, and James McAlonan, treasurer. The board of directors consists of James McAlonan, Harry J. Wiener, E. G. Brady, O. W. Bashaw and S. R. Gates.

**American Trucks are Wanted in Venezuela**, according to the report of an American consular officer in that country, who states that a firm in his district is interested in trucks of 1 to 2 tons capacity and desires to receive catalogs, prices and discounts. Correspondence may be in English. The inquiry was published in *Commerce Reports* of December 31, 1915, and bears the serial No. 19696. Further information regarding it may be procured from the main office of the Bureau of Foreign and Domestic Commerce, Washington, D. C., or any of its branches throughout the United States.

**Goodyear Heights**, a tract of land developed by the Goodyear Tire & Rubber Co. adjacent to its Akron, O., plant, has just been made a part of the city of Akron by an annexation ordinance passed by the city authorities. The tract consists of 100 acres which was purchased 3 years ago. Streets were laid out, paved, sewered and graded, and electric light, gas and water provided and homes built and sold to the workmen of the Goodyear company on the basis of so much per month as rent with no initial payments necessary. A small lake, partly within the property, has made is possible to arrange a fine pleasure ground with tennis courts, football and baseball fields and swimming and skating facilities. The tract already has a population close to 1,000, with school, church, stores and other necessary institutions of a rural community.

**Italy's Imports and Exports of Motor Trucks** during 1914 were valued at $117,816 and $779,204, respectively. In the previous year, 1913, the imports were valued at $155,415 and the exports at $444,956. In view of the war, it is interesting to note that the exports of 1914, with the war in progress, were greater than in 1913 by approximately $334,000. This apparent discrepancy may be explained by the fact that when the war broke out, the demand for trucks by the military compelled the truck makers to employ extra workers and introduce night shifts in order to supply the demand. Until the military organization had secured enough trucks, export was prohibited, but after a sufficient number had been delivered, exceptions were granted to that provision with the result that with the makers' greater production, there were greater numbers of trucks free for exportation. It is also interesting to note that the imports of trucks during 1914 only dropped off approximately $38,000 in 1914 as compared to 1913.

**Edison Storage Battery Bulletin**, entitled "The Edison Storage Battery for Electric Commercial Vehicles," just published by the Edison Storage Battery Co., Orange, N. J., is a thirty-two page brochure which describes the Edison alkaline battery and pictures a great many trucks in various classes of work that use that type of battery. It also contains an extract from an address by Charles P. Steinmetz, chief consulting engineer of the General Electric Co., in which he states that, theoretically, the life of the Edison battery is limited only by mechanical destruction. The book is well illustrated and should prove of assistance to central stations, electric garages, dealers and others promoting the sale of electric commercial vehicles.

**Trade Directory of Central America and the West Indies** has just been published by the Bureau of Foreign & Domestic Commerce, government printing office, Washington, D. C., as a supplement of the new edition of the World Trade Directory. The supplement contains a completely-revised list of the names of importers and merchants in Central America and the West Indies made by the American consular officers in co-operation with the Bureau of Foreign & Domestic Commerce. Two new features have been incorporated in the listings, as follows: 1—The American and other foreign agents of Central American and West Indian importing firms. 2—The names of the parent firms of branch houses located in various Central American and West Indian cities. The publication is a directory of Central American and West Indian buyers for use by exporters and manufacturers in the United States. It is published in octavo form, bound in buckram, and is sold at 60 cents per copy. It may be obtained from the superintendent of documents, government printing office, Washington, D. C.

**A Supplement to the South American Trade Directory**, recently published by Bureau of Foreign & Domestic Commerce, contains a completed revision of the lists of importers and merchants located in Buenos Aires, Bahia Blanca and La Plata, Argentina, in addition to a similar list for Caracas and La Guaira, Venezuela. The supplement contains thirty-seven pages and is sold at 5 cents per copy. It may be obtained from the superintendent of documents, government printing office, Washington, D. C., or from any of the branch offices of the Bureau of Foreign & Domestic Commerce.

**"Selling Motor Vehicles in Central America,"** is the title of a short article appearing in *Commerce Reports* of November 26, 1915, which outlines a carefully-planned itinerary throughout Central American countries for a motor vehicle salesman which would undoubtedly lead to the establishment of a good trade, according to its author, Special Agent Garrard Harris, United States Department of Commerce, Bureau of Foreign & Domestic Commerce. He further points out, however, that such a trip would be somewhat of a missionary journey at the present time, due to the lack of good roads, and that large immediate results could not be expected. As outlined, the trip should be started from New Orleans by steamer, the first stop being Belize, British Honduras; from thence to Stann Creek by banana boat and then by steamer to Livingston, Guatemala, the port of entry for the great coffee district of Alta Verapaz. From Livingston, the salesman can get a launch to Puerto Barrios, Guatemala, and from there take a steamer to Puerto Cortez, La Ceiba, and other points on the north coast of Honduras, coming back to Barrios and up to Guatemala City. The port of San Jose de Guatemala is next on the line of travel, and at this point the salesman can take a steamer for Acajutla, Salvador, going from there to San Salvador. San Salvador is wealthy and progressive, and the roads good, so that possibly a number of orders could be obtained for both motor trucks and passenger cars. From Salvador the salesman can go to Tegucigalpa, Honduras. The road between San Lorenzo and Tegucigalpa, 80 miles long, is one of the finest roads in all Central America. It was built by American machinery. There is a big field for motor trucks at that point, for now all the freight is hauled by two-wheeled ox carts, which take from 6 to 10 days to make the trip, one way. From San Lorenzo, the salesman can take a steamer to Corinto, Nicaragua. From Corinto, he may go by ship to Puntaarenas, Costa Rica, and thence overland to San Jose, the capital. Costa Rica has some of the best roads in Central America, and these should provide a fine opening for motor trucks to handle coffee. A salesman's expenses on such a trip as outlined would be about the same as in the United States. He should be allowed more time, however, than for a trip of the same length in the United States, due to the slower method of doing business.

## Commercial Motor Vehicle Agencies Recently Established Throughout the Country

| | | |
|---|---|---|
| Wilmington, Del. | Brockway | Cabill & Co. |
| Kansas City, Mo. | Chase | Chase Motor Truck Co. of Missouri |
| Portland, Me. | Commerce | D. E. McCann's Sons |
| Grand Rapids, Mich. | Denby | George A. Fox |
| Alliance, O. | Federal | Alliance Motor Car Co. |
| Denver, Col. | Kisselkar | J. M. Patrick |
| Fremont, Neb. | Kisselkar | McCoy Motor Car Co. |
| Indianapolis, Ind. | Kisselkar | Indianapolis Kisselkar Sales Co. |
| Norfolk, Neb. | Kisselkar | Mr. Ford |
| Passaic, N. J. | Kisselkar | G. T. Ray |
| Scribner, Neb. | Kisselkar | Ball & Zeman |
| Carbondale, Pa. | Kochler | Lackawanna Garage |
| Maryland Line, Md. | Kochler | J. Curtis Krout |
| Pittsburgh, Pa. | Kochler | J. B. Van Wagener |
| Trenton, N. J. | Kochler | Louis W. Reeder |
| Jerseyville, Ill. | Mogul | William Springman |
| Grand Rapids, Mich. | Republic | E. C. Patton |
| Allentown, Pa. | Vim | Krause Auto Co. |
| Binghamton, N. Y. | Vim | Binghamton Motor Car Co. |
| Cape May Courthouse | Vim | Cape May Auto Co. |
| Dayton, O. | Vim | Durable Dayton Truck Co. |
| Findlay, O. | Vim | Gantle's Garage |
| Glenn, Minn. | Vim | B. A. Goff |
| Jackson, Mich. | Vim | Capital Auto Co. |
| Keokuk, Ia. | Vim | J. W. B. Doniel |
| New Brunswick, Mich. | Vim | Enterprise Garage |
| New Haven, Conn. | Vim | Kirk's Garage |
| Scranton, Pa. | Vim | Samuel Weinberg |
| Sellersville, Pa. | Vim | E. S. Jacoby & Son |
| St. Cloud, Minn. | Vim | Grundman Auto Co. |
| Yonkers, N. Y. | Vim | F. P. Dean |
| Youngstown, O. | Vim | Vim Truck Sales Co. |

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## THE BALANCE SHEET TELLS THE STORY

The balance sheet gives the only correct estimate of motor truck value. The price of the truck does not tell how much service you get per dollar invested. How many days' work, how many hours per day, how much mileage, how much expense for repairs, and how much value is left in the truck after each year of service are things to consider. Truck users who keep a close record of these items, know the economy of buying White Trucks.

*ONLY GRAND PRIZE for Motor Trucks, Panama-Pacific International Exposition.*

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Their strength and easy running qualities are assured by Timken Axles and Timken Bearings. All the component parts are equally high grade.

**MIAMI TRAILERS**

are strong, light, easily attached or detached, turn in limited space and have great carrying capacity. The first cost is low and there's no operating expense.

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*Chains—Keys—Hand Milling Machines*


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LOOK for the announcement which will appear on the front cover of Commercial Vehicle of the issue of February first.

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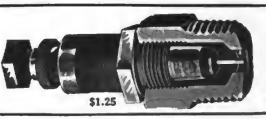

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4 Ton

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Each and every working part heat-treated, pack hardened, pot cooled.

Treatment effected by men expert in the science of metals and annealing.

*It is Lavine thoroughness which gives security*

*Write for Catalog and Data Sheets*

**Lavine Gear Co., Racine, Wis.**

# MODERN 1915
## GET IN LINE

With your co-operation, we are able to supply you with just the truck that will give the most satisfactory and profitable results in your business—Chain or Worm drive models.

**Model "H" 1½ Ton Chain Drive. Model "L" 1 Ton Worm Drive**
**Model "M" 1½ Ton Worm Drive. Model "P" 2 Ton Chain Drive**

**The Bowling Green Motor Truck Co., Bowling Green, Ohio**




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# HAHN

The acknowledged merits of Continental Motors, Timken Axles, Brown-Lipe and Warner Gears—combined with the experienced skill of a pioneer wagon builder and eight years in truck building are responsible for the quality and efficiency of HAHN TRUCKS.

**Made in 1, 1½, 2 and 3½-tons capacity**

All bodies are built at the factory to conform to individual requirements.

*Let us know your needs.*

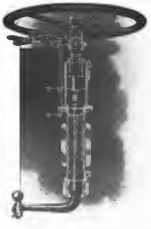
HAHN MOTOR TRUCK COMPANY HAMBURG, PA.

STANDARD

on good motor truck construction

INVESTIGATE

Fore and Aft Steering Gears



Cross Type

Enormous bearing surfaces

Perfect Lubrication

Best material thruout

Finest workmanship

Ross Gear & Tool Co.

790 Heath Street

Lafayette Indiana

BUDA MOTOR "The part to buy the car by"

# 250% Increase

in the output of fine Automobile and Truck Motors by the Buda Company (not "war orders") should make careful manufacturers do some thinking.

May we have the pleasure of exhibiting some points of Buda superiority

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January 22 to 29 Gallery 33 and 34

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THE BUDA CO., HARVEY, CHICAGO SUBURB ILL.

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370 6 Broadway, N. Y. 1112 S. Michigan Ave., Chicago 1311 Dime Bank Bldg., Detroit

# KOEHLER ONE TON TRUCK $895

OVERHEAD VALVES

INTERNAL GEAR REAR AXLE

4 Cylinder, 35 H. P.—Shaft Drive. Selective sliding transmission. 129 inch wheel base.

It's big and powerful and embodies the most up-to-date engineering practice throughout.

Price is unprecedented! "The Koehler is easier to sell than to sell against."

H. J. KOEHLER S. G. CO.

155 Ogden Street Newark, N. J.

Agency correspondence solicited.

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IN every community there are many Motor Truck prospects to whom a sale can be made when factory requirements are not too rigid.

We will help dealers with prospects to make the sale; also, it may be a step toward establishing a permanent and profitable connection. You don't have to buy a "demonstrator."

The
United Motor Truck Company
GRAND RAPIDS MICHIGAN

# By Jingo!—
# That's Real Service

said one of our customers.

Yes! and we can give *your* felt orders the same prompt attention if you'll let us.

Why not try doing business with an A-1 house and get "what you want when you want it"?

Dependable goods only; accuracy in manufacture, prompt service and attractive prices are the watch-words of our business.

***"If it's made of felt, ask Booth"***

*Write—Wire or Phone*

## The Booth Felt Co., Inc.

440-450 Nineteenth St., Brooklyn, N. Y.
116-118 South Fifth Ave., Chicago, Ill.
12th St. and Grand Trunk R. R., Detroit, Mich., 'Phone, Market 5804

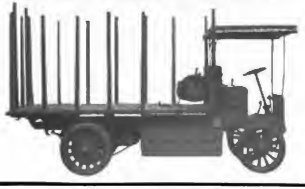
## The Long Distance Electric

In all problems of heavy service electricity is the most dependable, economical, and satisfactory power. Atlantic Electric Trucks are built in ½, 1, 2, 3½ and 5-ton models. Guaranteed to give 15% more mileage than any other electric truck of equal capacity and same equipment.

Hundreds of users unhesitatingly endorse the known superiority of Atlantic Long Distance Electric Trucks. Our new models have every proven safety factor in construction; modern steering apparatus, allowing driver extreme latitude and flexibility in traffic, maximum traction, smoother rolling, scientific load suspension, etc. Every truck carries with it a guarantee of faithful performance, adequate service, and mileage plus beyond your requirements.

The experience of our experts in handling delivery problems will be of value to you. Let us know your requirements. Our recommendations entails no obligation.

**Atlantic Electric Vehicle Co.**
**Vanderbilt Bldg., New York**
**Main Office and Factory, Newark, New Jersey**



**$725**
*Open Express Delivery Car*

**Overland DELIVERY CARS**

**$750**
*Panel Body Delivery Car*

*Prices f. o. b. Toledo*

## Certain and Satisfactory Delivery Service

The Overland Delivery Car has a powerful, dependable 35 horsepower motor. It is electrically lighted and started. It has high tension magneto ignition, revolving oil indicator, electric control switches on the steering column, large tires, and many other big advantages.

*Catalogue on request. Please address Dept. 191.*

**The Willys-Overland Co., Toledo, Ohio**
Also Manufacturers of Overland and Willys-Knight pleasure cars.



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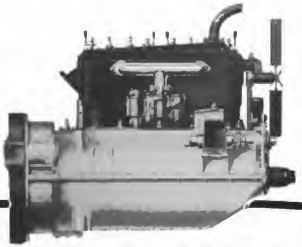


A Real Long Stroke Truck Motor

Wisconsin

CONSISTENT

Type TU
4 in. bore, 6 in. stroke.

Type UU
4¼ in. bore, 6 in. stroke
Cylinders interchangeable.

Note these features.

CYLINDERS—Cast en bloc.
CRANKSHAFT—Four bearing, chrome nickel steel, 2 in. diameter
VALVES—Rich Tungsten steel
CONNECTING-ROD BEARINGS—3 in. long, 2 in. diameter.
BEARINGS—Bronze, Babbitt metal lined
CAM SHAFT—One piece, cams integral.
OILING SYSTEM—Force-feed hollow crankshaft.
3 POINT SUSPENSION

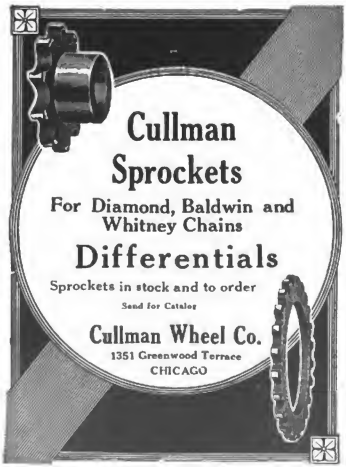
Write today for detailed specifications and illustrations.

WISCONSIN MOTOR MFG. CO., Dept. 310 MILWAUKEE, WIS., U. S. A.

One of six Jeffery Quads in the service of the United States Army Signal Corps. This is the most powerful portable wireless station in the world. The Jeffery Quad drives, brakes and steers on all four wheels.

The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin





Cullman Sprockets

For Diamond, Baldwin and Whitney Chains

Differentials

Sprockets in stock and to order

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Cullman Wheel Co.
1351 Greenwood Terrace
CHICAGO



The Wood Hydraulic Hoist

SOLVES THE DUMPING PROBLEM FOR MOTOR DUMP TRUCKS

"Made in Detroit Only" by the

WOOD HYDRAULIC HOIST & BODY CO., Detroit, Mich.
Successors to WOOD HYDRAULIC HOIST CO., St. Paul, Minn.




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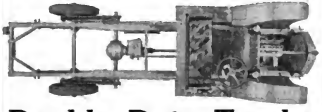
# SOUTH BEND



## Double Duty Trucks

—once put in service—always remain in service.

Whatever your business may be there is a SOUTH BEND DOUBLE DUTY TRUCK that will give you the utmost efficiency and satisfaction.

***Wisconsin motors, Warner transmission, Sheldon axles, Ross steering gear, Bosch ignition. Either chain or worm drive.***

SOUTH BEND DOUBLE DUTY FIRE APPARATUS in all cases more than performs its duty.

Attractive Dealer Proposition. Write us at once.

**South Bend Motor Car Works**
**SOUTH BEND, IND.**

***Expert Testimony!***

# EISEMANN
MAGNETOS

have been adopted as standard equipment by the great ignition experts of

## 108 Manufacturers

—the largest in the country—including

**72 Trucks**
**11 Pleasure Cars**
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Tractors, Mining Machinery, Stationary Engines, Gasoline Locomotives, etc.,

***There Must be a Reason!***

**The Eisemann Magneto Co.**
**Sales and General Offices:**
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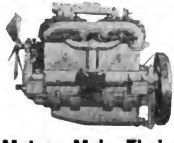
Detroit, Mich., 805 Woodward Ave.



## Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

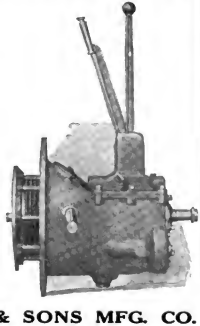
Do not determine on a motor for your truck till you have sent us your specifications

**BEAVER MFG. COMPANY**
**Milwaukee Wisconsin**

# FULLER
## Unit Power
## TRANSMISSIONS

Model
"T U"
¾-1 Ton

Model
"T U 2"
1½-2 Ton
4 Sizes



*Particulars sent on request*

**FULLER & SONS MFG. CO.**
**Kalamazoo, Mich.**

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# Standard Tractor

Model C 6-ton Model D 10-ton

The ideal vehicle for the man with a heavy hauling problem

A real tractor (not a modified motor truck) handling its load at the cost of a 3- or 5-ton motor truck.

Economical of gas, oil, and tires. *One 6-ton model has run 12,000 miles on its original tires and these tires are still good for 4000 miles more.*

A high class product, standardized throughout. Quickly attached or detached to any type of body. 6-ton model turns easily in 25 feet, 10-ton in 29 feet.

**Some Open Territory for Responsible Agents**

**STANDARD TRACTOR CO.,** 120 Waverly Ave. Brooklyn, N. Y.

*"CHASE" YOUR DELIVERY*

WORM DRIVE WATER COOLED

*Do this today—send your name and address to receive*

**CHASE'EM**

*—a newsy, meaty, bright monthly about Chase Trucks, Chase people and Chase accomplishment. You will look for it after your first issue.*

**Chase Trucks have given accurate haulage performance for ten years. They uphold motor truck theory perform the day-in-and-day-out service for which trucks are bought. They combine simple control with strength to accomplish; power to labor heavily with silence while doing it; flexibility of action with solidness to outlive rough consideration. This is not factory opinion. It is the rolled-into-one judgment of Chase owners. It is the reason why every twelfth truck is a Chase. Models range from 1500 lbs. to 3½ tons capacity, all worm drive, water cooled. Details will be sent by the factory and explained by an intelligent representative. Write**

**CHASE MOTOR TRUCK CO. SYRACUSE, N. Y.**

COVERT COVERT COVERT

TRANSMISSIONS

# Of the Highest Quality

Covert Transmissions are the result of many years' successful transmission building—today they are recognized as the best—not only in point of service and durability but also in regard to quietness and all around efficiency.

Made in various models for different sizes and types of cars—Covert Transmissions will free you from transmission troubles. Let us show you how they fit your construction.

**Covert Motor Vehicle Co.**

SALES OFFICE Detroit, Mich. FACTORY Lockport, N. Y.

# The Highest Efficiency

is attained in this worm-drive truck by powerful construction according to a correct four-wheel-drive principle which distributes and equalizes the driving stresses.

**MORTON TRUCKS, 1½ to 6 Tons Capacity**

in both regular type and four-wheel-drive are built to take hard usage and show permanent economy.

This serviceability is due to the thorough design of the vehicle as a whole and the use of the better standard parts. Study the specifications.

Write us for open territory and get into this four-wheel-drive business.

**Morton Truck & Tractor Co.**

HARRISBURG, PA.




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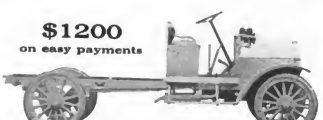
**$1200**
**on easy payments**



# INDIANA

**Model S ¾ to 1-Ton**

An absolutely reliable truck at a moderate cost. Small up-keep and excellent service under all conditions.

35 H. P. Rutenber motor, worm drive, insures the speed required for rapid and economical deliveries. Its sturdy yet flexible chassis gives it the strength to provide against overloads and any possible careless handling.

A wonderful vehicle for both user and dealer.

*Circular on request*

**Harwood-Barley Manufacturing Co.**
Marion, Indiana

# FACTS

**Price Economy**
**Operating Economy**
**Up-keep Economy**

*Are Three Big Features of*

## *The* DETROIT TRAILER

Made in 8 models ranging from a 2-wheel trailer with 1200 lbs. capacity for use with Fords to a 4-wheel trailer holding 5 tons. With single or double end draw.

*Send for agency proposition*

**DETROIT TRAILER CO., Inc.**
671-3 Atwater St. Detroit, Mich.
Branch Factory for Canadian Trade
WALKERVILLE, ONT.

*Can't break it!*

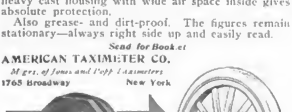
## DREADNAUGHT
### Transimeter Hub Odometer

is guaranteed against injury to mechanism. The heavy cast housing with wide air space inside gives absolute protection.

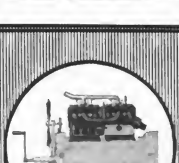
Also grease- and dirt-proof. The figures remain stationary—always right side up and easily read.

*Send for Booklet*

AMERICAN TAXIMETER CO.
*Mfgrs. of Jones and Pfaff Taximeters*
1765 Broadway New York



*Highest Award at Panama-Pacific Exposition*



**NORTH AMERICAN MOTORS**

For power and flexibility—for smooth, consistent delivery of power—for uniformity of performance and freedom from oiling, heating and bearing troubles, our

**Model D 4¾x6**
**Heavy Duty Motor**

answers every requirement for trucks of 3-, 3½- and 4-ton capacity.

Correspondence with manufacturers and engineers solicited.

**NORTH AMERICAN MOTOR CO.**
POTTSTOWN, PA.

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# Baker Electric Trucks

1-ton, 2-ton, 3½-ton, 5-ton

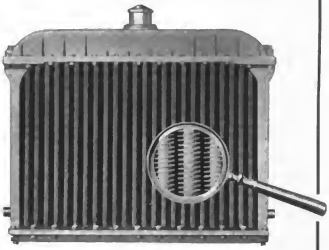
The truck shown above is the sixteenth shipped to the Pittsburg Plate Glass Company operated in seven cities

Investigating the best method of trucking has been responsible for the many growing fleets of Baker Electric Trucks in use by largest concerns whose watchword is "Efficiency."

Our Plan of Co-operation under which these trucks were sold and our catalog upon request.

THE BAKER R & L CO.
Cleveland, Ohio

# Seamless Copper Helical Tube Cooling Sections



*Are Guaranteed for the Life of the Motor on Which They are Installed*

Helical Tube Construction is Accepted as the Best by the Leading Truck Makers of America

*Manufactured only by*

ROME-TURNEY RADIATOR CO.
ROME, NEW YORK

# REPUBLIC

INTERNAL GEAR DRIVE

# MOTOR TRUCKS

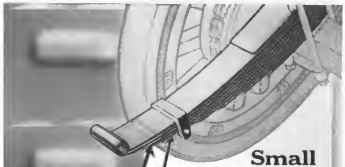
$995 OPEN EXPRESS BODY INCLUDED

LOW PRICES and Republic construction increased our volume of sales 800% last year. Four models—a Republic for every purpose: F (illustrated above); E, 1-ton, $1275; A, 2-ton, $1575; T (illustrated below). All built to great overload capacity. Write for folders. Dealers and service stations in over 200 principal cities. Write for our liberal proposition.

Republic Motor Truck Co.
Dept. N, Alma, Mich.,
U. S. A.

$2350

Model T, 3-ton, $2350
Buda motor 4½ x 5½, Bosch high-tension magneto, Stromberg carburetor, 4 speeds forward, Firestone tires, 185 in. wheelbase, 185 in. $50 extra.



# Small Cavities —Big Service

NEAR the end of each leaf is a lubricating cup filled with a long-lived lubricant that spreads between the leaves, giving smooth action, long service and silence to

# DETROIT SPRINGS For Trucks

Their resilience, flexibility and strength to carry any load over any road should remind you to ask "What springs are on this truck?" Detroit Springs are built for the particular model of the truck upon which they are to be used, and are

**Guaranteed for Two Years**

Write for the book "From the Ore to the Motor Car" and read the story of Detroit Steel Springs.

Detroit Steel Products Co.
2260 E. Grand Blvd., Detroit, Mich.

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For The Big Business of The
NEW YEAR

1916 is going to be the big truck year. Business is booming — and everywhere the call is heard for sturdy, reliable trucks—the kind that always do the work.

MACK TRUCKS

have set the pace for 20 years. In capacities of from 1 to 7½ tons they meet the demands of any business.

1916 will be a big year for MACK dealers because they always have the right truck for the desired purpose—and the best of cooperation from headquarters.

*Write for complete description of the MACK line.*

INTERNATIONAL
MOTOR COMPANY

64th St. and West End Ave.
NEW YORK

BIGGEST MOTOR TRUCK VALUE ON THE MARKET

**The Gramm-Bernstein Truck**

is in a class by itself when it comes to mechanical perfection, ease of operation, and freedom from that ever troublesome repair bill.

Figure on GRAMM-BERNSTEIN equipment and you will have the solution of your hauling problem.

GRAMM-BERNSTEIN Motor Trucks embody in their design our own wonderful non-gear-stripping transmission, worm gear rear axle and self adjusting clutch.

THE GRAMM-BERNSTEIN CO.
Dept. B1 Lima, Ohio

NORMA

"NORMA"
BALL BEARINGS
(PATENTED)

PRECEDENT

*"A form of proceeding followed, or deemed worthy to be followed, as a pattern in similar or analogous cases."*
*—Century Dictionary*

The precedent here offered for the consideration and guidance of motor truck and car builders, may be stated as follows:

**At least 75 per cent of the high-grade ignition apparatus, lighting generators and starting motors made in America today, carry "NORMA" Ball Bearings as standard equipment. These are the electrical accessories used on motor trucks and cars of the better class—they are a feature of the superiority of these trucks and cars.**

**You will be adding to the service capacity of your trucks and cars by adopting "NORMA"-equipped accessories.**

*Catalog?*

THE NORMA COMPANY OF AMERICA
1790 BROADWAY NEW YORK
BALL, ROLLER, THRUST, COMBINATION BEARINGS

NORMA



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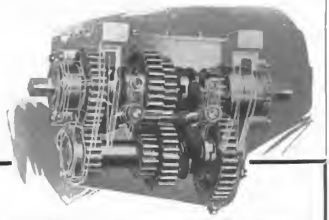
# TRUCK SPRINGS

In two pieces of steel of identical chemical analysis, there may be wide differences in physical properties as a result of steel making.

It is therefore not only necessary that steel be tested for proper analysis before entering the plant but that the springs in all stages of manufacture be given thorough tests for strength, structures, dynamic qualities, etc.

When you buy springs you ought to know where and how they are made, and the makers of Cleveland-Canton Springs are proud of their plant and glad to have you visit them for an inspection.

THE CLEVELAND-CANTON SPRING CO.
CANTON, OHIO



## Cotta Transmission

Selective Type, Sliding Clutch for all commercial and pleasure vehicles.

Many years of experience in the manufacture of transmissions for motor vehicles have established COTTA supreme.

**All Gears Always in Mesh**
**No Plain Bearings**

Gears that at times run idle, mounted on roller bearings.

Specify COTTA in your next car, for service.

COTTA TRANSMISSION COMPANY
814-18 S. Main Street Rockford, Ill.

## New 1916 Edition of Questions and Answers

**By Victor W. Page, M. E.**

$1.50

$1.50

**On Modern Automobile Design, Construction, Driving and Repair**

Just off the press. A practical self-educator, consisting of 37 progressive lessons. Contains over 600 pages. Profusely illustrated with photographs and drawings of practical working parts. Includes all the 1916 developments.
Sent prepaid to any address on receipt of price.

**Book Dept., The Commercial Vehicle**
**239 West 39th St., New York**

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# Celfor INTERNAL GEAR DRIVE Axles

**For Motor Trucks—Absolutely Quiet**

If you want a strong efficient unit drive that is specially designed for truck work, from one to three tons capacity, write us for complete information about the

## Celfor
## Internal Gear Drive Rear Axle

It possesses marked constructional advantages which commend it to thoughtful designers, engineers and truck makers. We shall be glad to go into these in detail on request.

**Write today for details, catalog and prices**

**Celfor Tool Company**

**Buchanan Michigan**

## For the Long Haul

—Where time is money and help is far off, use

# Firestone

**Hard Base Truck Tire on Quick-Removable Rim**

Delays have no terrors for the driver of a truck carrying this equipment.

No "creeping" on the rim; no separation from base. Long mileage and truck protection.

**Tires for Trailers**

Every type—heavy and light—brought to highest degree of perfection. See the Firestone service man.

**Firestone Tire and Rubber Co.**

*"America's Largest Exclusive Tire and Rim Makers"*

**Akron, O.—Branches and Dealers Everywhere**

# S-M-C "STANDS" THE STRAIN

Is this point worth $5000 to you?

Do you insure against the failure of your brakes to stop and hold your truck in an emergency—to save life and property—to avoid damage suits and legal expenses?

Do you insure against losing the service of your trucks at frequent intervals while they are having their brakes relined and incurring material and labor costs that aggregate an unnecessarily large amount?

***OR***

Do you use S-M-C—which holds absolutely, stops a car instantly in emergencies, permits of a flexibility of brake control from slow retardation to an abrupt stop and wears evenly and long and is in perfect condition until it has worn out all over instead of in spots; cutting replacement costs one half?

The true answer is reflected on the operating accounts of many departments of your business and is finally found in your bank balance.

If your dealer is catering to the truck business he carries S-M-C and can tell you about it. If not, write to

**Staybestos Manufacturing Co.**

**GERMANTOWN, PHILADELPHIA PENNSYLVANIA**




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# Hercules Shipping Trunks for Package Delivery

**The Hercules shipping trunk is made any special size to fit your auto trucks or wagons**

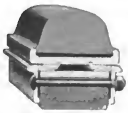
It is the same construction that is used by large concerns throughout the United States for delivering all sorts of goods. It is made of heavy vulcanized fibre, reinforced with steel and put together with steel rivets, no nails used in construction.

The Hercules shipping trunk pictured here provides a safe method for package delivery as well as the freight and express shipments.

The Hercules telescope box, especially adapted for the safe and convenient handling of fragile goods, such as cut glass and crockery, is made of vulcanized fibre and fitted with soft pads. The popular sizes are 12 x 12 x 12, 16 x 16 x 9, 16 x 22 x 4 and 20 x 15 x 10.

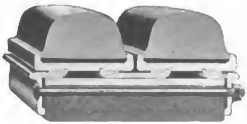
**Fibre Specialty Mfg. Company**
Kennett Square, Pa.

Single Pressed-On



Single Demountable

Dual Pressed-On



Dual Demountable

# Kelly-Springfield

## TIRES For COMMERCIAL VEHICLES

For maximum mileage at minimum cost, equip your trucks with Kelly-Springfield sectional Block Tires on the rear wheels and Kelly-Springfield Pressed-On or Demountable endless Tires on the front wheels. This is the ideal tire equipment for commercial cars. It will deliver record mileage even under unusually severe service conditions.

**Kelly-Springfield Tire Co.**
Akron, Ohio
Branches in All Principal Cities

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on

GOODRICH

WIRELESS

TRUCK TIRES

## 10,000 to 12,000 miles—

over Chicago pavements—is mighty good service. That's why Wm. Wrigley Jr. Co. are such strong "boosters" for Goodrich Wireless Truck Tires.

3-ton and 5-ton trucks are used. Saurer, Packard and Stegeman are their makes.

Be guided by the experience of big concerns like Wrigley—with their shrewd and careful purchasing departments. Don't experiment—specify Goodrich Wireless Tires and be *absolutely sure* of satisfaction.

**The B. F. Goodrich Company**

Service Stations and Branches in All Principal Cities

World's Largest Rubber Factory, AKRON, OHIO

# MAXIMUM POWER

The great problem in heavy hauling lies in the difficulty encountered in overcoming such accidental conditions as muddy roads, soft, sandy ground or heavy snow. In overcoming such conditions as this, every ounce of motor power must be delivered direct to the points of traction, in other words, to *all four wheels*.

# DUPLEX : 4 WHEEL DRIVE

is the most efficient truck on the market. Its performance has been the marvel of men who know. Simple in construction. Economical in operation.

It has been adopted by the United States Government for military purposes.

Manufactured in 2- and 3-ton models.

An attractive proposition is open to dealers. Write now.

**THE DUPLEX-POWER CAR COMPANY**

*Manufacturers of*—FOUR WHEEL DRIVE TRUCKS

CHARLOTTE, MICH.




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# Why We Emphasize the KREBS Governor

THERE are so many exceptional points of construction about the KREBS Truck that we sometimes seem to slight them in the emphasis we place on the Automatic Governor.

## Krebs

**But the importance of this feature is so great that we feel that every truck dealer as well as every truck owner should be made to realize its importance.**

**The** KREBS Motor is governed by **a device which is set to a maximum speed when the truck leaves the** factory. A lever on the starting wheel controls the Governor **and can be set to any desired speed up to the maximum.** The motor **will automatically stay at this speed as long as it is running, no matter what the conditions of traffic.**

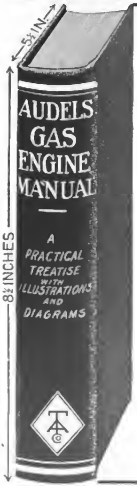
The advantages of this are enormous. It relieves the driver of a great responsibility and leaves him free to guide the truck. As we have stated so often, "he has nothing to do but steer." Besides this feature, the KREBS Truck is a trim, sturdy, business-like and handsome truck built by a firm of EXPERTS and able to handle efficiently every demand made upon it.

**Made in ¾, 1, 2 and 3-ton capacities.**

*Write for information of interest to dealers*

**Krebs Commercial Car Co.**
**CLYDE, OHIO U. S. A.**






# Audel's Gas Engine Manual

This volume gives the most valuable information respecting the construction, care and management of **Gas, Gasoline and Oil Engines, Marine Motors and Automobile Engines,** including chapters on **Producer Gas Plants** and the **Alcohol Motor.**

The work is divided into 27 chapters. Each chapter is illustrated by diagrams which make it a thoroughly helpful volume, containing 512 pages, 156 drawings, printed in large, clear type on fine paper, handsomely bound in rich red cloth, with gold top and title, measuring 5½ x 8½ inches, and weighing over two pounds.

The book is a practical educator from cover to cover and is worth many times the price to any one using a gas engine of any type or size.

**Price - - - - $2.00 Postpaid**

## Book Department The Commercial Vehicle

**239 West 39th Street, New York**

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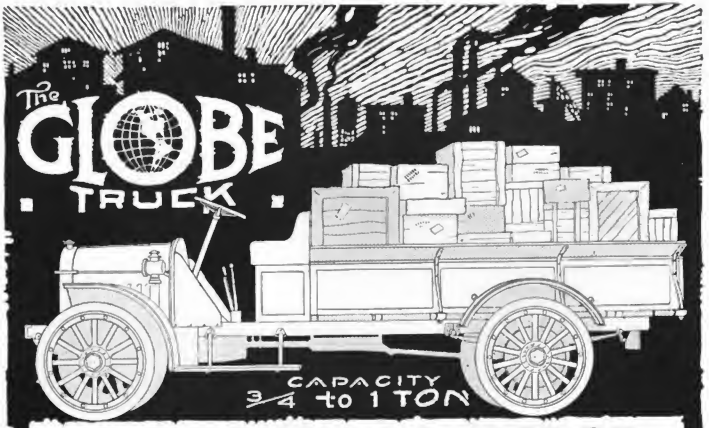


SIX CYLINDER MOTOR

PRICE

$1085.

SPECIFICATIONS

6 Cyl. Continental Motor.
Dixie Magneto.
Schebler Carburetor.
Internal Gear Rear Axle.
Sheldon Front Axle.

SPECIFICATIONS

"Long" built-up Radiator
Circulating Water Pump.
Complete with Tools.
F. O. B. Northville or Detroit.

# THE TRUCK AHEAD

**DELIVERIES** are considered a part of the contract with all agents and users by the manufacturers of this truck. They are amply able to care for customers. Ask for booklet "G."

**DESIGN** in the Globe Truck combines the best features that truck engineering has developed. Its parts include the best of those proven successful in every field of use. Its flexible, vibrationless six cylinder motor doubles its life and quadruples its usefulness. Ask for descriptive booklet "L."

**CO-OPERATIVE SERVICE** includes continuous advice and assistance from the manufacturer to the user, beginning with a compilation of cost data affecting his particular field and including periodic advice through years of service of every phase of increasing a truck's usefulness. Ask for service plan "O."

**CO-OPERATIVE SALES** include continuous bi-weekly sales campaigns covering every line of business. Ask for sales circular "B."

**THIS OPPORTUNITY** is not being offered to your competitor—it is being offered to YOU. Are you ready? Are you the one who can see into the future? Are you with us? Visit us, wire or write today for the Globe exclusive ageney contract and the dealer's special sales campaign appropriation

*Mark Your Reply*
*"Proposition E"*

*Globe Truck Dept.*
THE GLOBE FURNITURE COMPANY
Northville, Mich.




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# SELDEN TRUCKS
## *for* 1916

*FOUR NEW MODELS*

| | |
|---|---|
| 1¼ Ton Worm Drive | 2 Ton Internal Gear Drive |
| 2 Ton Worm Drive | 3½ Ton Worm Drive |

The best selling line ever offered to live dealers and discriminating buyers.

We finance our dealers when necessary and assist them in making sales and profits.

Responsible and representative dealers wanted in all open territory.

Catalogs and full information furnished upon application.

**Selden Truck Sales Company**
**Rochester, New York**




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# Do You Know?

## Westinghouse
## Starting and Lighting Equipments

are standard on the leading makes of trucks in the United States, and will be furnished on order with the following makes:

*American La France*
*Case*
*Dart*
*Duplex*
*Federal*
*Gerlinger*
*Gramm-Bernstein*
*Gramm Motor Truck*
*Kelly-Springfield*
*Kissel*
*Lauth-Jergens*
*Locomobile*
*Michigan Hearse*
*Moreland*
*National*
*Nelson-Le Moon*
*Pierce-Arrow*
*Republic*
*Riddle Coach*
*Stegeman*
*Stewart*
*U. S. Carriage*
*Wichita*

**Westinghouse Electric & Manufacturing Co.**

Automobile
Equipment Department

Shadyside Works
Pittsburgh, Pennsylvania


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# The U. S. Army buys Trucks equipped with the

M&S DIFFERENTIAL

## Soon ALL Truck buyers will demand it

The M & S Differential for Commercial Vehicles gives all the advantages of a differential lock, yet automatically allows for differentiation of wheel travel in turning corners.

### Pulls Both Wheels

The action of the spiral gears in the M & S is such that power is evenly distributed to **both** rear wheels when tractive resistance is equal. When one wheel loses traction in mud, deep sand or on slippery pavements, the power **goes to the wheel having the GREATEST TRACTION** instead of the one having the least, as is the case with the present bevel gear differential.

### Made by the World's Greatest Differential Factory

The American manufacturing rights for the M & S Differential have been secured by Brown-Lipe-Chapin Co., of Syracuse, a guarantee in itself of quality and an assurance that the M & S will "stand up."

### Standard Equipment in the Celfor Internal Gear Axle

The Celfor Tool Co., of Buchanan Mich., can now supply M & S equipped internal gear axles.

*U. S. Patents pending. Patents in foreign countries. All infringements will be prosecuted*

### Get ALL Your Power

Greater efficiency is possible with the M & S because you get all the power all the time. Near wheel can't spin, so tires wear longer. You use less gasoline because you always have a steady pull. The danger of skidding is lessened because wheel spinning is impossible and if one wheel has any traction at all, that wheel will hold the road.

### Here's What "Jeffery" says:

During all our tests M & S differential never failed to work entirely satisfactory. We find that anti-skid devices are unnecessary when cars are equipped with your differential, which in itself is sufficient to warrant its use on a car and will be quickly appreciated by the public once it is demonstrated. Furthermore, the feature that the power is applied to both wheels at all times will take the car through roads that it would be impossible to pass through with an ordinary differential.

We are very much pleased that we were of the first to whom this new invention was submitted.

THE THOMAS B. JEFFERY CO.

**For sample M & S Differential built to fit your axle, write to Brown-Lipe-Chapin Co., Syracuse, or to**

**The M & S Gear Co., 1036-42 David Whitney Bldg., Detroit, Mich.**




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ACME
THE TRUCK OF PROVED UNITS

# DEALERS—Write or Wire!

Secure the early 1916 orders to be placed immediately by business firms in your territory for ACME 2-Ton Trucks.

The ACME has greater truck dimensions on 148-inch wheelbase—more power—larger guaranteed overload capacity under normal conditions—extra spacious appearance—well balanced and artistic design—and fourteen proved units harmoniously combined, backed by leading American manufacturers.

| | | |
|---|---|---|
| Continental Motor | Timken Bearings | Long Radiator |
| Timken Worm Drive | Warner Clutch | Eisemann Magneto |
| Timken Front Axle | Warner Transmission | Rayfield Carburetor |
| Timken Rear Axle | Detroit Springs | Gemmer Steering Gear |
| Smith Pressed Steel Frame | | Pierce Governor |

In the ACME buyers get the benefit of the experience of thousands of truck users—save all experiment.

From starting crank to tail light there is not an experimental feature in the ACME—nothing but proved units.

*Obtain the immediate January and February orders*

## Clinch the Agency—GET IMMEDIATE TRUCK BUSINESS!

Make the biggest, best class of truck buyers your boosters.

Our territorial proposition lays solid basis for permanent, profitable connection with this strong financial organization.

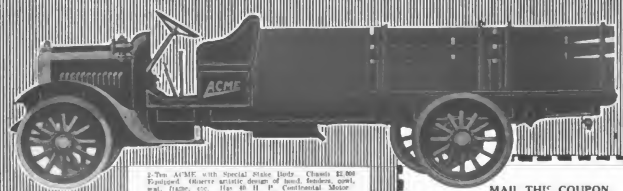
NEW
¾-*Ton*
*Truck*
For Spring Delivery
Watch for Announcement

Act quickly to get this early 1916 business in next 30 to 40 days. Send Coupon for Agency Terms and Agreement—OR WIRE.

**Cadillac Auto Truck Co.**

11 Mitchell Street

Cadillac Michigan




2-Ton ACME with Special Stake Body. Chassis $2,000 Equipped. Observe artistic design of hood, fenders, cowl, seat, frame, etc. Has 40 H. P. Continental Motor. 3 point suspension unit power plant, overdrive gears and general dimensions above standard.

MAIL THIS COUPON

CADILLAC AUTO TRUCK CO.,
11 Mitchell Street, Cadillac, Michigan.

Please send all the facts about the ACME 2-Ton Truck and your Agency offer for this territory.

Firm Name .....

Individual .....

Address .....

Present Agent for .....



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# G. V. Electrics are Particularly Adapted to the Wholesale Grocery Field

Whether you distribute 5 tons of groceries to your own branch stores or to retailers, you have from 20 to 40 stops per day, and lose practically one-third of the working day in waits.

**A 5-ton G. V. Electric in Boston**

In a recent test run made with a 5-ton G. V. Electric in New England the truck was given the very hardest kind of work in competition with the firm's gasoline truck. The G. V. was out 10 hours and 25 minutes. It covered 34.2 miles and was running but 5.16 hours out of the 10.25 hours. Twenty-two (22) stops were made and 19,540 pounds of groceries delivered to 16 stores. Cost of electricity 89 cents, oil almost nothing. The Electric was purchased next day.

The G. V. Electric is "the best of the best type" for 85 per cent of all average city work. Keep the gasoline truck out on the long hauls where its higher operating cost will be justified.

Ask for catalogue No. 73 and data of special interest to grocers.

## General Vehicle Company, Inc.

*General Office and Factory*

**LONG ISLAND CITY, NEW YORK**

NEW YORK CHICAGO BOSTON PHILADELPHIA



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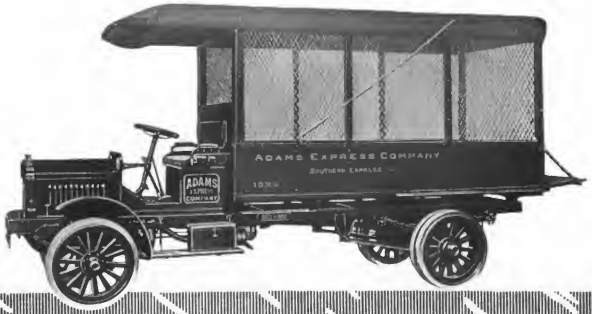


# Indisputable Evidence

We can make no claim for our product that would impress the careful, shrewd buyer of motor trucks one-half as much as the fact that the demand for

## BROCKWAY TRUCKS

has compelled us three times to double the size of our plant.

Assertions of what our product will do are far less convincing than such indisputable evidence of what our product does do. National industries and private individuals ordered from us 223 per cent more trucks last year than during the year before.

What this recognition of merit means is perfectly plain to the type of dealers we want as representatives—and we have an entirely new proposition for you which will strongly appeal to your business sense and show you the advantages of becoming known as the live, wide-awake BROCKWAY dealer in your vicinity.

Our production is large—our overhead expense is comparatively small—our material purchases are on a cash basis—we seek only a fair margin of profit and thus are able to give more for less money. Our reputation is established and your opportunity is now being offered to you.

Represent the BROCKWAY and it will be your successful way.

**6 MODELS**
**¾ Ton, 1¼ Ton and 2 Ton**
**Worm or Chain Drive**

**Standard Units**

*Write To-day—Others Will*

## Brockway Motor Truck Company

**Cortland, N. Y.**



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GMC

GENERAL MOTORS COMPANY

TRUCKS

## Come to Truck Headquarters for "the Truck to Fit Your Business"

Through many years' experience building a good product in trucks alone, through the employment of sane business methods with dealers and consumers everywhere—The General Motors Truck Company has become

**The largest exclusive truck factory in the world.**
**The only truck company building a complete line of gasoline and electric trucks in all capacities.**

At truck headquarters you find both chain and worm drive, both gasoline and electric trucks in all capacities. If you are undecided as to the size and type of trucks best suited to your needs, we are in position to offer you suggestions of value, absolutely without prejudice, for even selfish motives would cause us to recommend the truck that would serve you best.

GMC trucks are making good in 135 different kinds of business, all over the world, in thickest city traffic, on lonesome country trails, under all conditions of road and weather.

Tell us what you have to haul—how much and how far—and the nature of your roads. We can give you information which may be of value to you, no matter what trucks you buy.

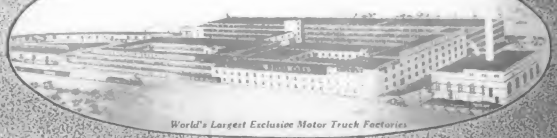
GENERAL MOTORS TRUCK COMPANY

*One of the Units of General Motors Company*

PONTIAC MICHIGAN

*Direct Factory Branches:*

New York Boston Chicago Philadelphia St. Louis Kansas City (37)



*World's Largest Exclusive Motor Truck Factories*



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# Breaking through with the FEDERAL

What are you doing? Are you still in the dim background of "Yesterday" with the ***line*** you are handling or are you a prosperous Federal dealer of "Today"?

Federalized Transportation has proven such an unqualified success in over five thousand installations that ***your*** success as a dealer is assured with this well known truck.

Made in 1½, 2 and 3½ ton, worm drive models, the Federal offers you an exceptional opportunity to get lots of business—enthusiastic customers and a good substantial income for yourself.

*Write us about the Federalization of your territory*

## FEDERAL MOTOR TRUCK COMPANY

**122-130 Leavitt Street**

**DETROIT MICHIGAN**




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# A Revolutionizing Motor Truck Tire

Tires are usually improved little by little. Motor truck tires especially, in the past, have been slowly developed step by step.

That's why the new United States Motor Truck Tire has startled the tire world, for it represents a gigantic leap forward in tire development.

## A New 800 ton Pressure Vulcanizing Process

For years all motor truck tires have been vulcanized under only about 1¼ tons pressure. Think of the difference. Recently the United States Tire Company bought a new type hydraulic press—the only one of its kind in the United States. This press applies 800 tons pressure to truck tires during vulcanization. This tremendous pressure forces every atom of moisture and gas out of the rubber and joins the rubber and the steel base in an inseparable union.

## Six Other Great Mileage Adding Improvements

In addition to the new 800 ton pressure vulcanizing process, the new tire contains six other vital improvements. Ask us about them.

# United States Tire Company

**Broadway at 58th Street** **New York City**

***Branches in all principal cities give prompt, liberal, courteous service***

UNITED STATES RUBBER COMPANY US RUBBER SYSTEM AND ASSOCIATED COMPANIES

THE HONOUR MARK OF A GREAT COMPANY




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# When a Truck Must Stop

It's simple enough to jam on the brakes and feel the speed slacken—the heavy speeding mechanism slow down.

But SUPPOSE—

Suppose, when the brakes are clapped on, the truck doesn't stop—the brakes don't hold—the truck scoots madly along like a crazy thunderbolt, and

SMASH!

Oh, it happens.

And when it happens the smashing of his truck is too small a penalty for a truck owner to have to pay for not being sure that the lining of his brakes would hold.

## Thermoid HYDRAULIC COMPRESSED Brake Lining - 100%



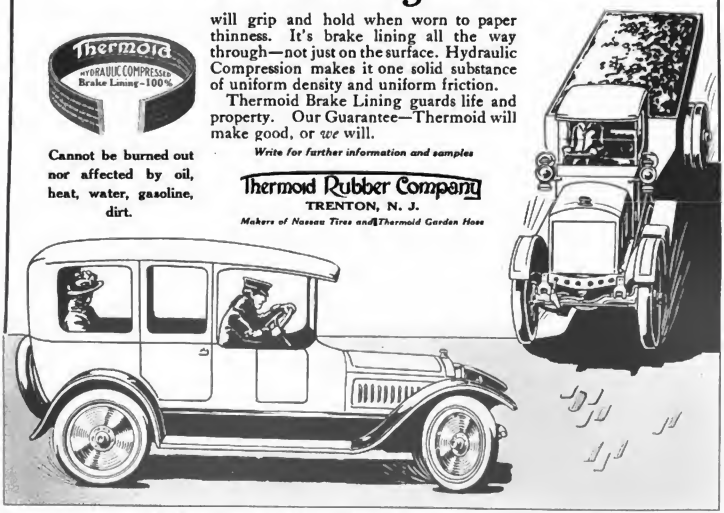

**Cannot be burned out nor affected by oil, heat, water, gasoline, dirt.**

will grip and hold when worn to paper thinness. It's brake lining all the way through—not just on the surface. Hydraulic Compression makes it one solid substance of uniform density and uniform friction.

Thermoid Brake Lining guards life and property. Our Guarantee—Thermoid will make good, or *we* will.

*Write for further information and samples*

**Thermoid Rubber Company**
**TRENTON, N. J.**
*Makers of Nassau Tires and Thermoid Garden Hose*





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# McGraw
## Heavy Duty Tires

Aside from constructional simplicity, wearing superiority and

### 8,000 Mile Guarantee

McGraw Truck Tires effect a remarkable saving in general truck up-keep and merchandise breakage, by their singular

### Shock-Absorbing Capacity, Unusual Toughness, and Extra Volume of Usable Rubber

To equip with McGraw Truck Tires is to insure your delivery service against costly delays—those expensive hold-ups for repairs brought on by the innumerable small jolts and jars which ordinary tires do not absorb.

McGraw Truck Tires are saving money for many of the largest motor vehicle users in the United States. They will do the same for you.

## The McGraw Tire & Rubber Co.
### East Palestine, Ohio, U. S. A.

New York
Buffalo
Dallas
Philadelphia

Chicago
Kansas City
Newark
San Francisco
Los Angeles

Boston
Atlanta
Pittsburgh
Portland




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# $119.54 Saved Each Month

That is the record of the Home Telephone Company, Santa Barbara, Cal., which purchased an International Motor Truck, and kept an itemized account for five and one-half months.

# *International Motor Trucks*

are being put to work by new firms in all lines every hour of every day, on the strength of such economy and efficiency showings as this. And they are duplicating such figures everywhere. Here is the completed line-up of **International** trucks and the recently announced rock-bottom prices:

| | | |
|---|---|---|
| **Model MA—1000 pounds capacity, air-cooled** | **$ 600** | ***Prices quoted here are cash f.o.b. Akron, O.*** |
| **Model M—1000 pounds capacity, water-cooled** | **710** | |
| **Model E—1500 pounds capacity, heavy duty motor** | **950** | |
| **Model F—2000 pounds capacity, chassis only** | **1500** | |

Thirteen thousand users of International Motor Trucks testify that they are worth the old prices. At these new prices, the lowest ever made for trucks of equal quality and capacity, International Motor Trucks are far and away the best bargain in the motor truck market today. Write to the address below for full description of these trucks and complete information.

**INTERNATIONAL HARVESTER COMPANY OF AMERICA**
(INCORPORATED)

**88 Harvester Building** **Chicago U S A**

***Agents Wanted in Unoccupied Territory. Write, 'Phone or Wire***




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# Good Roads Help Motor Truck Dealers

Single handed, we have started a logical, virile, campaign for the betterment of road conditions.

For the development of good roads is a big step towards the future development of the motor truck industry. And we work continuously with an eye to the years ahead.

Our efforts already have produced big, lasting results.

We have vitally interested thousands of state, county and municipal commissioners in this big propaganda. Business men—big and little—in all sections of the country are giving us their hearty co-operation.

This activity is not only helping us—it is helping our distributors.

And the Garford national selling organization is being continually strengthened by the addition of substantial, wide-awake dealers who look for future growth as well as present sales.

If you are a dealer of this type write to us. The Garford proposition will surely interest you.

Garford Motor Trucks

A few months ago S. M. Williams, Sales Manager of the Garford Motor Truck Company, distributed several thousand copies of his booklet "Roads—Their Influence upon Economic and Social Conditions," among county officials, engineers, prominent business men and educators. Since then requests have been received from Good Roads Associations, Chambers of Commerce, and influential men for over 200,000 copies of this booklet for distribution in good roads campaigns in all sections of the country. Your copy will be mailed on request.

*Please Address Dept. 103*

## Garford Motor Truck Company, Lima, Ohio

Manufacturers of Trucks of ¾, 1, 1½, 2, 3, 5 and 6 ton capacity




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# Commerce Trucks 1916

## 1500 Lbs. Capacity

**The COMMERCE TRUCK** is a delivery truck that meets with the greatest efficiency, every demand that can be made upon a truck in the 1500-lb. class.

It is a "complete" unit, made up of standard parts welded together by master designing and years of experience in this one line of truck-manufacture.

The models are as follows:

*Chassis Complete, $875.00 F.O.B. Detroit*

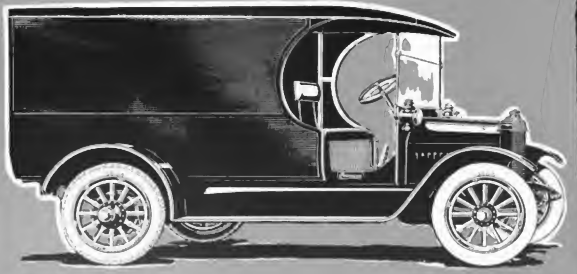
**Model NC—Body designed for grocery, department stores, etc. $975.00 F.O.B. Detroit. As shown.**

**Model NH—With standing top and waterproof curtains. $975.00 F.O.B. Detroit.**

**Model NA—Open express type. $975.00 F.O.B. Detroit.**

*Write for dealer proposition*

**COMMERCE MOTOR CAR COMPANY**
**Detroit, Michigan, U.S.A.**



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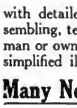
# DYKE'S AUTOMOBILE & GASOLINE ENGINE ENCYCLOPEDIA $3.00




**Revised and Enlarged Edition of This Book**

**NOW READY**

**(Fourth Edition)**

**Entirely Rewritten—Improved Illustrations.**

*The Late* ***Edition Is Improved At Least One Hundred Per Cent.***

## A COMPLETE FORD INSTRUCTION ADDED

with detailed instructions on the construction, repairs, assembling, disassembling, testing and recharging magnets. In fact every detail a repairman or owner ought to know. Fully illustrated with Mr. Dyke's original simplified illustrations.

A Simplified Treatise. Technical Subjects Brought Down to a Non-Technical Basis.

## Many New Subjects Have Been Added To This Book;

for instance, the subject of

**Six, Eight and Twin Six Engines**, explaining the principle, construction, degrees of crankshafts, firing orders, etc., simplified.
**Electric Starters, Generators and Lighting Systems**—up-to-date and simplified—how to care for and adjust.
**Delco, Atwater-Kent and all leading ignition systems**—simplified.
**Valve Timing and Ignition Timing**—simplified so a ten-year-old boy can understand.
**Trucks, Tractors** and many other new subjects added.
**Repairing**—This subject has been greatly improved and enlarged—everything you want to know from building and equipping a garage for home or business to repairing and adjusting.
**Digest of Troubles**—You will understand how to diagnose troubles by a process of elimination, not by guesswork.

Every detail of every part of a car is explained, the fundamental principle is first learned, then the variance of construction. Under the subject of Repairing and Adjusting it will tell you how to adjust and care for each part.

Sometimes we are asked, "How do you teach all about cars?" In reply to this will state: If you had before you all the cars made, you would find about three different principles of construction of parts—we teach you the variance of these principles of construction after you first learn the principle.

Step by step, the book takes you through engine principle, valve timing, ignition and ignition timing, carburetion, etc., then the electric systems of all kinds; operating a car, repairing, etc.

A teacher, guide and reference on everything pertaining to motoring—simple as the A-B-C's.

It's worth ten times its cost, if only placed on the shelf and used as a reference. 1750 illustrations — 640 pages—49 instructions.

## Easy to Read and Understand

Mr. Dyke's books are simplified—easy to read and understand—fully illustrated—in fact, the illustrations almost tell the meaning without the use of the text.

The Index is very complete; any trouble, remedy or repair can instantly be located. A Dictionary of motoring terms is also provided.

**RECOMMENDATIONS**

Elwood Haynes, Chas. Duryea, Lord Montagu of Lundon, founder of Brooklands tracks and member of the House of Lords; Elbert Hubbard (deceased), Barney Oldfield, each contributed a letter of recommendation of the value of this book.

The book is sold by forty automobile schools from Maine to California.

**ONE HUNDRED THOUSAND PURCHASERS OF DYKE'S BOOKS SAY IT IS THE MOST COMPLETE, PRACTICAL, SIMPLIFIED BOOK PUBLISHED.**

—for fifteen years Mr. Dyke (better known as "Dr. Dyke of St. Louis") has been publishing automobile books; he published the first practical one in America.

—for eighteen years he has been connected with the Auto industry, having originated the first Auto supply business and manufactured and marketed the first constant level type carburetor in America. He also designed and built several early experimental automobiles—both gasoline and electric.

Note the number of instructions and number of pages devoted to each.

Each and every subject fully illustrated.

*Address all orders to Book Department*

**The Commercial Vehicle, 239 W. 39th Street, New York**



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# Take for Instance--Here

"Your car should have bearings that hold the wheels steady on rough roads—bearings that will stand excessive shocks and loads. You know S. K. F. Ball Bearings permit the axle to deflect without binding. And there is nothing rigid in car construction. And remember, too, to hold the wheels steady requires bearings that do not wear loose and permit the wheels to 'shake.'

"S. K. F. are good because *two* rows of balls carry the load and provide increased bearing capacity. This special S. K. F. feature is a preventative against wear. Especially when skidding or side road action takes place. It is here that S. K. F. Ball Bearings are virtually 'life savers.'

"Of course you know that ball bearing equipped cars permit longer coasting — give more miles per gallon of gasoline and especially when they're S. K. F you get a feeling of security on two rows of Swedish Crucible Steel balls. Yes, sir! the service you get from your car is vitally dependent upon the bearings.

"S. K. F. Ball Bearings are good bearings to buy."

**SKF**

**BALL BEARINGS**

**SKF BALL BEARING CO.**

**50 CHURCH STREET NEW YORK CITY**

No. 1-1-15-16-C.V.

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# Velie

**Model 26**
**3½-Ton**
**$3350**

## Compare Velie Values In Truck Construction

VELIE Truck factory is now concentrated on two models that are proving unusual capacity, power, strength and economy in the hardest service to which trucks were ever submitted. In these extreme tests Velie Trucks have gained a signal leadership. Comparison of Velie Values at once discloses the reasons. Write for details. The two trucks now engaging the full facilities of our big truck plant are:

**Model 25, 1½-2-Ton Capacity $2250**
**Model 26, 3½-Ton Capacity $3350**

Velie construction is featured in both models by Worm Gear Drive—Heavy Duty Continental Motors (4⅛x5¼ in Model 25 and 4½x5½ in Model 26), Velie-Stewart Vacuum Feed—Tubular Radiator—Four Forward Speeds, with direct drive on fourth—Steel Raybestos disc clutches, extra depth of frames—Driver's seat and cab included with chassis—Gas Head-lights, and Prest-O-Lite tank besides the regular oil lighting equipment.

The United States government uses Velie Trucks. Government experts, after an extended examination, approved Velie construction. Keep in touch with Velie Truck news for information that means profitable business for dealers in every community.

**Velie Motor Vehicle Co., 121 Velie Place, Moline, Ill.**

**WORM GEAR DRIVE**
# Trucks




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# REO

## Are You Overlooking This Bet?

AT THE NEW YORK SHOW a certain successful automobile dealer came into the Reo booth and said:

"I FIND I'VE BEEN overlooking the best bet in the automobile business—the truck end of it.

"FUNNY HOW I FOUND it out too," he continued. "It was this way. When that four-column Reo truck ad was published in my city, a peculiar mistake occurred. My name was run at the bottom of it as Reo Motor Truck distributor for that territory. Seems the distributor who handles Reo pleasure cars hasn't wakened up to the opportunities of the truck business and so the publisher got the idea that, being a live one, I was the representative.

"WELL, ANYWAY, I found out something I hadn't known before. That there is a lot of truck business to be had in my territory. I should have had it long ago. Why people I had not dreamed were in the market for trucks came in next day eager to look at and to know about Reo Trucks. Seems as if they are all going to discard the old slow, uncertain, expensive horses and install the cheaper and more reliable as well as more capable trucks.

"SO I'M HERE TO SAY that if my territory is still open I want it—I will sell a lot of Reo trucks in the next twelve months."

NOW THERE WAS A DEALER—and he is a live one too—who had to be told by his customers instead of him telling them, that the day of motor delivery has arrived. That the motor truck end has become one of the most lucrative branches of the automobile-selling business.

ARE YOU ANOTHER like him? Are you one of those who have failed to note the rapid growth of motor trucks. That at last Motor vehicles have been developed to the point where they are more reliable and cheaper to maintain than horses—and that that fact is now universally recognized in the commercial world?

IF SO—WELL, we need say no more. One tip is all you need. If Reo trucks are not already represented in your territory we will expect to hear from you forthwith.

**Reo Motor Truck Company, Lansing, Mich.**

120




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EXCLUDING one low-priced car, more than 80% of the axles in use carry Brown-Lipe-Chapin Differential Gears.

More than one hundred manufacturers depend upon Brown-Lipe Transmission sets in their product.

Surely this is ample evidence of the quietness and all-around superiority of Brown-Lipe products.



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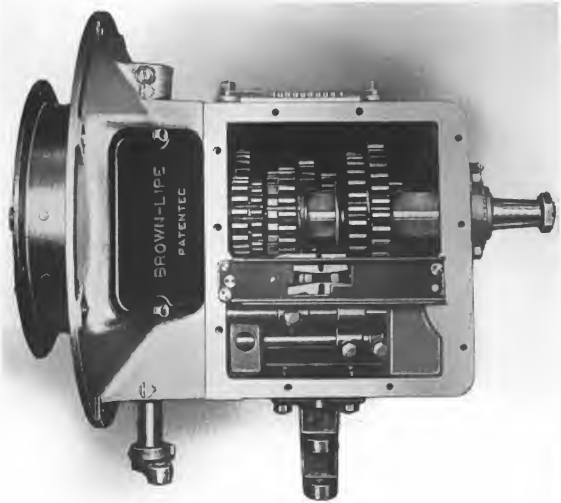


Brown-Lipe Gear Co.
TRANSMISSIONS

Brown-Lipe-Chapin Co.
DIFFERENTIALS

SYRACUSE, N. Y.

NEW YORK
Thos. J. Wetzel, 29 W. 42d St.
CHICAGO
K. Franklin Peterson, 122 So. Michigan Ave.

DETROIT
L. D. Bolton, 2215 Dime Savings Bank Bldg.
SAN FRANCISCO
A. H. Coates, 444 Market St.

Foreign Agent, Benjamin Whittaker, 2, Norfolk Street, Strand, London, W. C.




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# SIGNAL

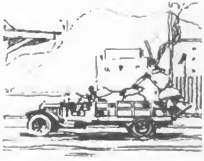
## Business Forethought

800% Increase in Motor Truck Sales in 5 Years. Definite known requirements in United States over 1,000,000 trucks.

The Signal Motor Truck Co. want a few real dealers in important territory now open.

The Signal Line—1 ton, 1½ ton, 2 ton, 3½ ton models

**Signal Motor Truck Co.**
**Detroit, Mich.**



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# Russel

## INTERNAL GEAR DRIVE AXLES

**Russel Internal Gear Drive Axles**

have been in satisfactory service for eighteen months, and have proven the correctness of the Internal Gear Drive Principle and the Russel Design.

Russel Motor Axle Co.
North Detroit, Mich.




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The Diamond T Motor Truck assembly not only contains the most capable units but the superiority of its "hook-up" makes it

## Specifications

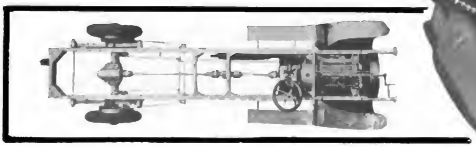
**¾-ton — 1-ton — 1½-ton — 2-ton — 3½-ton**

Continental Motors
Rayfield Carburetors
Brown-Lipe Transmission
Timken Front Axle
Gemmer Steering Gears
A. O. Smith Frames
Bosch Ignition
Spicer Universal Joints
Brown-Lipe Clutch
Timken-Detroit Rear Axle
Timken-David Brown Worm Gear
Mather Springs
Schwarz Wheels

**Your investigation will bear out every claim we have made for scientific engineering and dependable construction and like that of thousands of business men, your selection of DIAMOND T equipment will mark the beginning of years of economical, successful and satisfactory truck service.**

**Diamond T Motor Car Company**
CHICAGO, ILL.

**Diamond T Motor Truck Company**
OF NEW YORK
245 West 55th Street New York City



Greater than the sum of its parts



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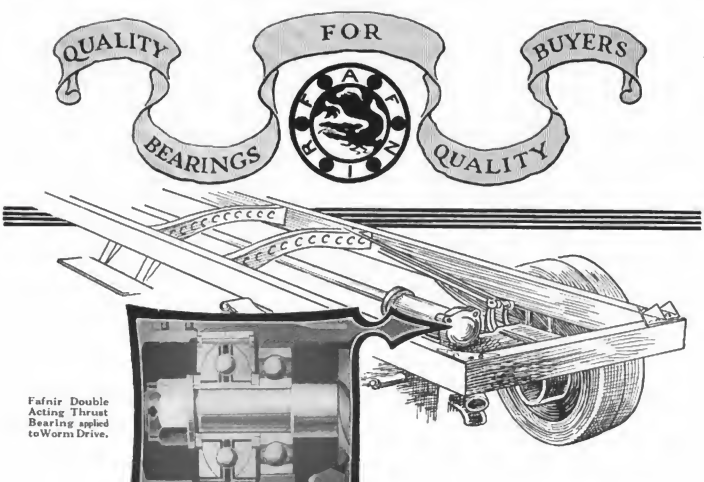


Fafnir Double Acting Thrust Bearing applied to Worm Drive.

## A TYPE FOR EVERY PURPOSE

WHETHER it be the small magneto type bearing on the magneto shaft or the large two row bearing in the rear wheel hub—whether the single row annular in the transmission case or the double-acting ball thrust bearing on the worm shaft—No matter—there is a Fafnir Ball Bearing made for that particular point of application and service.

Our production comprises the widest possible range of types and sizes for selection and each bearing manufactured you can depend is a **quality bearing.**

# THE FAFNIR BEARING COMPANY

CONRAD PATENT LICENSEE

MAIN OFFICE & FACTORY
NEW BRITAIN, CONN.

DETROIT OFFICE
752 WHITNEY BLDG.

CHICAGO OFFICE
39 SO. CLINTON STREET




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# Going Up!

Both in sales and production Sheldon Worm Gear axles are breaking records daily—and yet the demand continues far ahead of the immediate supply.

All of which is but another proof that, ultimately, efficiency always wins.

For on efficiency alone—efficiency in the hands of the ultimate consumer, efficiency basically possible because of superiority of design—have Sheldon Worm Gear axles made good.

Illustrations herewith show various types of the product of the Gramm-Bernstein Company who are users of Sheldon Worm Gear axles.

## SHE

## WORM G

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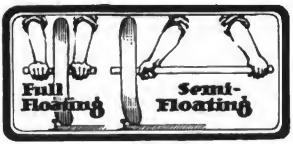
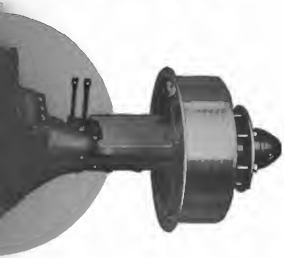
# LDON
## EAR AXLES



The four cardinal features in Sheldon design are—

Semi-floating construction.
Ball bearings for worm loads.
Drive through rear springs.
Brakes on rear wheels.

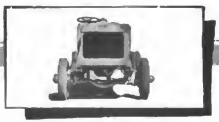
The pencil sketch illustrates graphically the great advantage of the semi-floating type of construction for resisting thrust loads. In this connection it must be remembered that these loads—loads that result from swaying and skidding—are the real determining factors of rear axle efficiency. By referring to this sketch it is plain to be seen that the semi-floating method of keeping the wheels straight (overcoming the effects of side thrusts) is vastly more positive and efficient than the full-floating method.

## The Sheldon Axle & Spring Company

*Makers of Springs and Axles for More Than 50 Years*

**Wilkes-Barre** **Pennsylvania**

Chicago: 122 S. Michigan Blvd. Detroit: 1215 Woodward Ave. San Francisco: 444 Market St.



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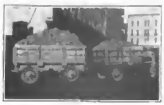


# For the Right Man

## *A Big Sales Opportunity*

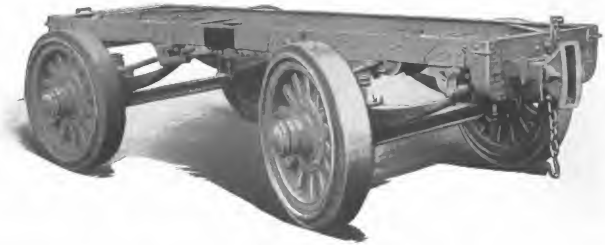
For the first time we are now ready to talk exclusive territory arrangement for TROY Motor Truck Trailer.

If your record is proof of your sales ability; if you can finance yourself; if you are an organizer who can build up and handle an organization as the business demands, we would like to open negotiations with you. We will close territories just as fast as we can find the right connection—not just any connection.

If you feel you meet the requirements and want to get into a permanent business for yourself where there is no limit to the income you can make, write us very fully, please. We will also be glad to hear from established firms who think they could handle our proposition to their profit and ours.

**THE TROY WAGON WORKS CO.**

**TROY, Miami County, OHIO**



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*One of the Fleet of Packard Light Service Trucks used by the Detroit Post Office.*

DRAWN FROM A PHOTOGRAPH

# Packard

## *Motorize your Light Hauling—You can do it Safely and Profitably, now that* PACKARD LIGHT SERVICE TRUCKS *are being Delivered to Customers*

THEY are built in two sizes, rated respectively at 1 to 1¼ tons and 1½ to 1¾ tons. The chassis price for the lighter unit is $2200; for the other, $2500, f. o. b. Detroit. They answer fully the widespread demand for light service carriers of Packard quality, and properly supplement the heavy duty trucks now earning dividends in more than 200 lines of trade.

They offer an immediate solution of any hauling problem requiring a really well-built light service truck of simple design, with speed enough for a wide radius of action.

For heavier hauling there are other units in the Packard line. Seven sizes altogether, ranging from 1—1¼ up to 6—6½ tons. *In sending for Catalog 16, please specify weight and character of load.*

PACKARD MOTOR CAR COMPANY, *Detroit, Mich.*

*Ask the man who owns one*



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# "The Spring Is the Thing"

## MATHER

Scientifically Heat-Treated

## SPRINGS

designed to insure

## Maximum of Elasticity and Endurance

with

## Minimum of Vibration

Genuine made only by

## The Mather Spring Company

Toledo, Ohio




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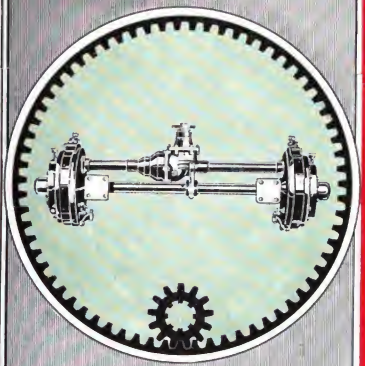
# Russel

## INTERNAL GEAR DRIVE AXLES



THE Internal Gear Drive is twelve years young. In continental Europe the most rigorous army and utility tests over every known passable road, field, mountain or street condition have proven beyond all doubt the superiority of the Internal Gear Drive, its economy and general efficiency over all types. This test is of compelling significance because it is infinitely more severe than the roughest usage of a truck by our most careless drivers.

The Russel Internal Gear Drive Axle renders the most efficient and most economical service of any motor truck axle on the market. It may be run miles and miles without oil — an important item and factor of insurance against costly expense where the driver is neglectful.

***Write today for complete details***

RUSSEL·MOTOR AXLE·COMPANY
*North Detroit Michigan*

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# MACKS

## Five MACKS Have Replaced 200 Horses

The Hygienic Ice Company of New Haven have five 7½ ton Macks. Each Mack covers 72 miles per day—moves 60 tons on a six mile haul every ten hours—replaces 20 horses. There *is* a reason why each new truck added to this fleet is a Mack.

The truck to economically meet the prospect's needs is to be found in the Mack line of 1 to 7½ ton trucks and 5 to 15 ton tractor-trailers. Chain and Worm Drive. Write for details.

INTERNATIONAL
MOTOR COMPANY
WEST END AVE. & 64TH STREET
NEW YORK

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Record Breaking Exports — Uncle Sam's First Motor Battery


# The Commercial Vehicle

Volume XIII
Number 2

AUGUST 15, 1915

Twenty Cents a Copy
Two Dollars a Year

## Over-sold—and Then Some!

WE ARE SO HEAVILY over-sold on Reo Motor Trucks we don't dare say any more about these greatest of all vehicles for fear of aggravating the situation.

WE ARE RUSHING WORK on our new four-and-one-half acre plant, however, and by October hope to more nearly supply the demands of our dealers and users.

MEANTIME, WATCH for the announcement of the new ¾-Ton Reo Truck—or speed wagon. It will fill a larger need than any other type of truck ever made, and it is of Reo quality in every detail.

ANNOUNCEMENT in September — delivering demonstrators now.

**REO MOTOR TRUCK COMPANY**

**LANSING, MICH. U. S. A.**


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# Booth

TRADE MARK

## What Motor Truck Manufacturers Say—

*"If it's made of felt, ask Booth"*

We have this distinction for
**Quality and Prompt Service**
and being Specialists in all felt requirements

*Write—Wire or Phone—Three Factories*

## The Booth Felt Co., Inc.

**440-50 Nineteenth Street - Brooklyn, N. Y.**
**12th St. and Grand Trunk Railroad, Detroit, Mich.**
**116-18 South Fifth Ave. - - Chicago, Ill.**


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With the Trucks at Plattsburg — Battery Service Experience

SEP 7 1915

The COMMERCIAL VEHICLE

Volume XIII
Number 3

SEPTEMBER 1, 1915

Twenty Cents a Copy
Two Dollars a Year

The World's Largest Governor Builders are able to solve your speed problems for you

*Demonstrations Solicited*

**The Pierce Speed Controller Company**

**Anderson : : : Indiana**

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Continental World-Famous

# Simplicity

Stripped of all superfluities, with clean-cut lines denoting native speed and strength, the Continental motor makes an instant appeal by its superb simplicity.

## Continental Motors

Long experience has eliminated from its design any suggestion of the uncouth, the crude, the needless. Its lines are the lines of beauty, as well as power. Its proportions are those not only of harmony, but also of correct balance. Its structure reveals the simple dignity of strength.

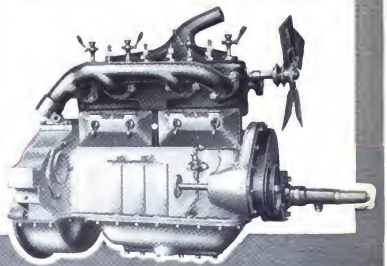
Continental simplicity goes far to account for Continental satisfaction; it assures readiness of control and adjustment, freedom from trouble, ease of repairs. Even the uninitiated can read the promise of the trim lines and fine proportions of this motor; the expert appreciates its masterly design. To both its simplicity is the mark of its merit.

Let Continental Simplicity point YOUR way to motor satisfaction in your next car or truck.

**CONTINENTAL MOTOR MFG. CO.**
**DETROIT, MICHIGAN**

Largest exclusive motor builders in the world

Factories { Detroit, Muskegon

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Trucks Indispensable to Wholesale Grocery

# The Commercial Vehicle

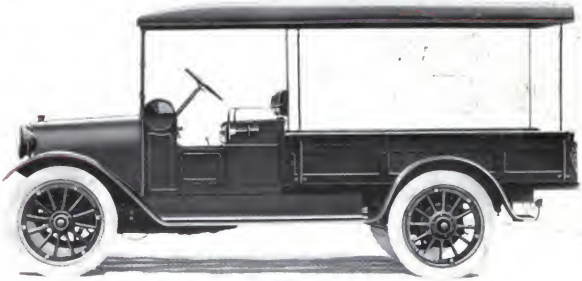
Volume XIII
Number 4

SEPTEMBER 15, 1915

Twenty Cents a Copy
Two Dollars a Year

**This is the New Reo ¾-Ton Speed Wagon**

**$1075.00**



AND THIS IS THE FIRST public announcement that has ever been made of it.

YET WE'VE ALREADY SHIPPED several hundred of them —dealers were wild with enthusiasm as soon as they saw it— users equally enthusiastic when they see one on the dealer's floor. Result, more orders a'plenty.

DEMAND IS TREMENDOUS — because this truck fills a broader field and a more urgent need than any other you've seen.

IF YOU'RE INTERESTED send for descriptive matter.

**REO MOTOR TRUCK COMPANY**

**LANSING, MICH. U. S. A.**

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# Working Out the *Right Idea* In Heavy Duty Rear Axle Design

In the rear axle of a truck power and load meet in such proportions that conventional axle design is not capable of solving the problem they present.

## Torbensen Internal Gear Drive Rear Axles

solve the problem—logically—practically—effectively and finally.

To the work of carrying the load the TORBENSEN Axle supplies a dead axle—a solid drop forged Steel I-beam axle.

For the work of applying the power the TORBENSEN Axle provides a live axle with a bevel gear differential.

Actual driving is done by internal gears working with immense leverage on a ring securely fastened to the rear road wheels.

Each member of the TORBENSEN Internal Gear Drive Rear Axle Assembly is the most effective of the kind—the lightest of its kind and the strongest of its kind. Compared with other types of final drives for commercial vehicles the TORBENSEN Rear Axle not only is immensely superior in strength, in the transmission of power, but in the saving of unsprung weight.

Your investigation will disclose facts, figures and demonstrations that will settle your mind on the TORBENSEN type final drive for all time.

**Torbensen Gear & Axle Co.**

**Cleveland** E. 72nd St. and L. S. & M. S. R. R. **Ohio**

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Trucks in Department Store Work


# The Commercial Vehicle

Volume XIII
Number 5

OCTOBER 1, 1915

Twenty Cents a Copy
Two Dollars a Year



The Pierce Speed Controller Company, the world's largest governor builders will establish Detroit Offices on November first, in the Ford Building, with Mr. B. G. Kramer formerly of the Kramer Governor Company in charge. : : : :

The Pierce Speed Controller Company

Anderson, Ind. Detroit, Mich.


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The Commercial Vehicle

Volume XIII
Number 6

OCTOBER 15, 1915

Twenty Cents a Copy
Two Dollars a Year


# Might Is Right of Way in the Realm of Motor Trucking

**REO**
**2-Ton Truck**

**Model J Chassis**
**$1650**

THAT IMPOSING REO FRONT—that heavily reinforced frame; that patented Reo radiator with the interchangeable units; that invulnerable front axle; these denote its strength and ability to hold its own in the fierce conflict for right of way in congested streets and alleys.

ANY MOTOR TRUCK that can't contest, on occasion, the possession of the road won't last long in that kind of service—in the hands of that kind of drivers.

THOSE EXTERNAL FEATURES are indicative of the quality, the sturdiness, the hardiness of this 2-Ton Reo throughout.

"50 PER CENT OVERSIZE in all vital parts"—the Reo factor of safety, is your guarantee of service and of satisfaction under the severest conditions of road and load.

**Reo Motor Truck Company**
**Lansing, Michigan, U. S. A.**

# SERVICE

In business life it is always well to provide for eventualities.

The busy business man perfects his organization with infinite care so that his incapacitation through illness or accident will not affect his business.

One way of insuring uninterrupted service from a motor truck is to specify steel wheels. then the worst that could happen from anything short of an accident that would annihilate the whole truck would be a slight bending of the wheels—a slight bending where a wood wheel would splinter to bits.

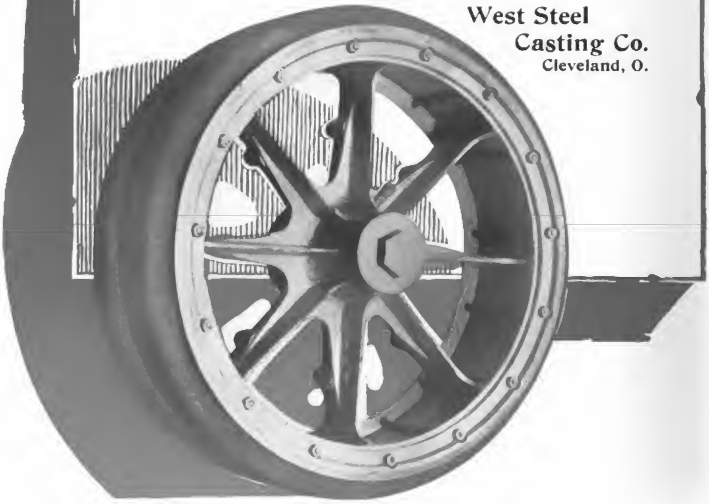
The successful production of steel wheels is a matter of experience. Any steel foundry can make them but it requires time proved knowledge to give them the necessary life and durability. We have had five years' experience and have 9,000 wheels in active service and are recognized as the foremost producers in America. This assures purchasers getting the kind of wheels they require.

## West's Cast-Steel Wheels

are cast in one piece, have no joints to open, bolts to shear or rivets to break, will not warp, shrink, twist, loosen or get out of true and are impervious to climate

We solicit your inquiries.

**West Steel Casting Co.**
**Cleveland, O.**



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The Field of the Trailer

# The Commercial Vehicle

Volume XIII
Number 7

NOVEMBER 1, 1915

Twenty Cents a Copy
Two Dollars a Year

It is the steady pace that eats up the miles and conserves the operating mechanism of your truck.

It is the bursts of speed and power that cause the strains yet accomplish little in the way of killing distances.

PIERCE MOTOR GOVERNOR

automatically feeds enough fuel to the motor to maintain its power and the speed of the vehicle at a safe, sane and effective degree.

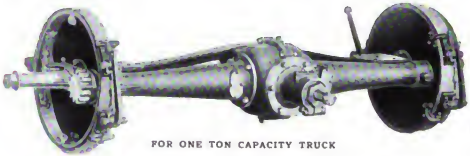
So practicable has its value been demonstrated to be that it has been adopted as standard equipment by the following famous motor manufacturers:

Continental Motor Mfg. Company
Rutenber Motor Company
Wisconsin Motor Company
Waukesha Motor Company
The Buda Company
Hazard Motor Mfg. Company
Hirschell-Spillman Company
Davis Mfg. Company
Beaver Motor Company

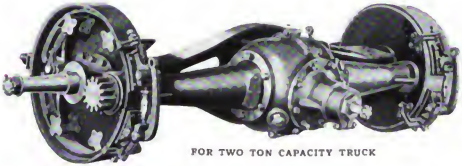
PIERCE GOVERNOR COMPANY
ANDERSON, INDIANA
*The World's Largest Governor Builders*

# Celfor Axles

## INTERNAL GEAR DRIVE for MOTOR TRUCKS



FOR ONE TON CAPACITY TRUCK



FOR TWO TON CAPACITY TRUCK

**CELFOR TOOL COMPANY**

**BUCHANAN, MICH., U. S. A.**

BUILT in a modern plant, with the finest of equipment, by an organization of experienced axle men.

¶ Our reputation and our pride in that reputation is a guarantee of absolute satisfaction. Write for specifications and prices.

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The COMMERCIAL VEHICLE

Volume XIII
Number 10

DECEMBER 15, 1915

Twenty Cents a Copy
Two Dollars a Year

**This is the New Reo ¾-Ton Speed Wagon** **$1075.00**

ONE REO DISTRIBUTOR SAYS: "I am almost glad that we have been unable to get enough Reo pleasure cars to keep our sales force busy the past three months.

BECAUSE IF WE HAD we probably would not have discovered for some time yet what a tremendous market there is for motor trucks, and how profitable a branch of the business it is."

IF YOU ARE in the same state of unblissful ignorance of this latest development in the industry, it behooves you to come up to date.

THE NEW 1500-POUND REO SPEED WAGON has proved a wonderful proselyter—it has shown many dealers the way to increased business and educated them to the possibilities of the truck end of it.

YOU SEE, IT FILLS such a broad field and such a general need.

**REO MOTOR TRUCK COMPANY**
**LANSING, MICH.** **U. S. A.**

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# WEST'S
## CAST STEEL WHEELS

Nothing wears tires faster than a wheel which gets out of alignment.

Road shocks — violent contact with curbs — the pressure that is employed in applying solid tires to truck wheels — even the weather is liable to throw the average wheel out of alignment — with the result that tire expense begins to climb.

With WEST CAST STEEL WHEELS tire wear is reduced to a minimum. A WEST CAST STEEL WHEEL of the same carrying capacity is lighter than a wooden wheel—it is so much stronger that it maintains its shape and alignment perfect under abuse that breaks the average wheel — it cannot warp nor can the pressure exerted in applying a truck tire throw a WEST CAST STEEL WHEEL out of true.

Maintenance of their alignment is but one of the advantages of WEST CAST STEEL WHEELS but it is vital — it means economy.

**West Steel Casting Company**

805-815 E. 70th St. Cleveland, Ohio

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Annual Review Issue

1 7 1916

# The Commercial Vehicle

Volume XIII
Number 11

JANUARY 1, 1916

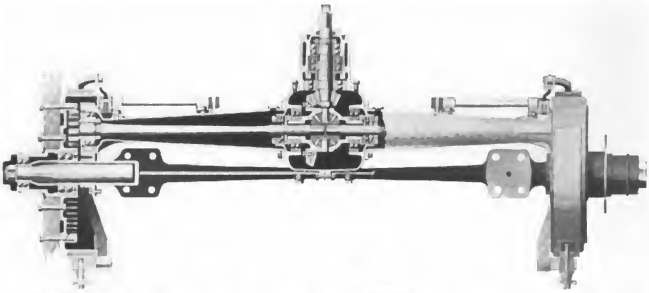
Twenty Cents a Copy
Two Dollars a Year

Start the New Year right by adopting the world's most popular Governor,

PIERCE

now used by at least 70% of all purchasers of governing devices.

PIERCE GOVERNOR CO.
ANDERSON, IND.
U. S. A.



# Celfor Axles

## INTERNAL GEAR DRIVE

## For Motor Trucks

Illustrating the special Celfor axle for electric vehicle service, both pleasure and commercial.

This axle is designed for a wide range of gear ratios to allow the use of high speed electric motors.

Is extremely light in weight by the use of aluminum castings throughout the live axle.

Highest efficiency at starting and slow speeds as well as high speeds is obtained by the use of the highest grade ball bearings and spiral ball thrust construction.

Absolute quietness is obtained even at extremely high electric motor speeds by the use of spiral bevel gears.

Full information on this axle and on our standard type axles from one to five tons capacity will be found in our new catalog just issued.

See our exhibit New York and Chicago Auto Shows.

**Celfor Tool Company**
**Buchanan, Michigan, U. S. A.**

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Annual Forecast Issue

JAN 20 1916

# The Commercial Vehicle

Volume XIII
Number 12

JANUARY 15, 1916

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# BESSEMER TRUCKS

To you who are interested either in the use or the sale of motor trucks the opportunity to advance your interests is offered by our line of commercial vehicles. Whether you buy or sell BESSEMER TRUCKS, each transaction helps in the development of your business and makes that business more remunerative.

Model G 1-ton Internal Gear Drive..... $975
Model D 2-ton Worm Drive..... 2000
Model E 3½-ton Worm Drive..... 2800

**BESSEMER MOTOR TRUCK COMPANY**
**GROVE CITY, PA.**

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# The LARGER MANUFACTURERS OF TRUCKS ARE USING

# WEST'S

# CAST STEEL WHEELS

Because WEST'S wheels have withstood every known test
Because not one in over 20,000 in use, has yielded to strain
Because they are lighter than wood wheels of like capacity
Because the first cost is forever the only cost
Because engineers designed, and mechanics built them
Because no truck equipped with them is idle on account of them
Because a real guarantee backs each separate wheel

There are many other reasons for the general use of WEST'S Cast Steel Wheels by truck manufacturers and the time is near at hand when no high grade truck, irrespective of price, will be marketed without these wheels.

We have still to receive the first complaint

Consider only your own interests and specify WEST'S Cast Steel Wheels on every truck you buy. They may be its regular equipment—if not you can get them any way if you insist

It's worth the insistence

**THE WEST STEEL CASTING COMPANY**
**805-815 East 70th Street . . . . Cleveland, Ohio**


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**One Bower Bearing cannot differ from another by 1 160 the thickness of the white line in the border**

1909

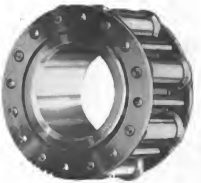
1910

1911

1912

1913

1914



1915

# The Irresistible Onward Sweep of the Bower Roller Bearing

The above represents graphically the consistent and gratifying increase from year to year of the business of the Bower Roller Bearing Company. In seven years it has grown 4700 per cent. Today this company provides bearings for nearly 100 leading car manufacturers of the United States.

# Bower

**Roller Bearing Co.**

**Detroit - - - - - Mich.**

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